PREDICTORS OF OUTCOME ONE YEAR AFTER A

NAVY RESIDENTIAL ALCOHOL TREATMENT PROGRAM

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Predictors of Outcome One Year After a
Navy Residential Alcohol Treatment Program[1]

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Executive Summary

Problem

The U.S. Navy operates the largest of the military inpatient alcohol rehabilitation programs. While the Navy's standard 6-week treatment program is very cost-effective, program administrators are exploring alternative treatment modalities to further decrease costs and expand treatment availability. To fairly evaluate such alternatives, policy makers need information regarding current success rates and the predictors of salient treatment outcomes.

Objective

Objectives of this study were to (a) describe the program enrollees in terms of a number of potentially influential characteristics, including demographics, personal history, and clinical presentation at intake; (b) assess treatment effectiveness in terms of alcohol use, job performance, and Navy career status one year posttreatment; and (c) determine which baseline factors are predictive of treatment success.

Approach

A total of 1,380 active-duty inpatients at 12 Navy alcohol rehabilitation facilities participated in the study. Baseline questionnaires tapping four predictor domains—demographics, family background, clinical profile, and treatment characteristics—were obtained from patients and their counselors. One-year follow-up data concerning alcohol use, behavior problems, retention on active duty, career status, job performance, and quality of life were obtained from participants, their work supervisors, their Drug and Alcohol Program Advisors (DAPAs), and automated Navy personnel master files. Every participant was tracked for the 12-month follow-up, including treatment failures and early service discharges. Descriptive statistics, bivariate comparisons, and multivariate regression techniques were used to analyze the data.

Results

The typical participant was an unmarried enlisted male (mean age = 27 yrs) who had been in the Navy for about 7 years. More than half (54%) were from a broken home, and nearly 59% had lived with a parent or guardian who exhibited a drinking problem. Approximately 45% of the sample had been physically, emotionally, or sexually abused as children. At entry into treatment, participants were drinking an average of 12.3 drinks per drinking day, 3-4 days per week. However, their scores on standardized clinical tests of alcohol dependency and psychiatric disturbance were significantly lower than scores for other clinical populations.

Follow-up data from one or more questionnaires were received for 84.3% of the sample. After leaving treatment, almost all participants had attended AA or comparable aftercare meetings, though not for the full 12 months as prescribed. Approximately 68% were abstinent

at follow-up; increased alcohol use was related to poorer scores on other outcomes, as well. Almost 30% of the sample had been discharged from naval service within one year, many for reasons involving alcohol, drugs, or misconduct. Yet 83% of the participants had been rated as "satisfactory" or "highly satisfactory" in their job performance, and 87% had been recommended for reenlistment or advancement.

Stepwise regression analyses were conducted for each criterion variable. Of the 15 prognostic indicators entered into the equations, a single variable—months of aftercare attendance—accounted for most of the variance in outcomes. Family background, clinical profile, and most demographic characteristics were not predictive of outcome; only paygrade and completion of treatment emerged as consistent co-predictors.

Conclusions

Navy alcohol patients tend to be identified and treated earlier in the development of their disorder than they might be in the civilian sector. In addition to this early intervention, the relative functionality of these patients at intake and their generally high success rates at follow-up suggest that this population might respond well to a less intensive intervention. Given the consistency and magnitude with which aftercare emerged as a predictor of outcome, it was recommended that alcohol program managers focus resources on aftercare support, paying particular attention to the development of aftercare options and to the discovery of predictors of aftercare attendance.

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It has become well-known that alcohol abuse and alcoholism are serious national problems. An estimated 11 million American adults exhibit symptoms of alcoholism or alcohol dependence, and an additional 7 million are alcohol abusers (U.S. Department of Health and Human Services [DHHS], 1990). The costs associated with alcoholism and alcohol abuse in terms of health care and lost productivity are high—nearly $130 billion in 1986 (U.S. DHHS, 1990)—and the costs in terms of human lives are higher still. Alcohol abuse is associated with elevated morbidity and mortality rates, especially as related to liver cirrhosis, various cancers, pancreatitis, cardiovascular disease, and peptic ulcer (Lieber, 1992; Longnecker, 1995; Popham, Schmidt, & Israelstam, 1985). Fetal exposure to alcohol is one of the leading known causes of mental retardation (Abel & Sokol, 1986), despite being 100% preventable. Nearly half of all violent deaths (suicide, homicide, accidents) involve alcohol (U.S. DHHS, 1990); more than half of all persons convicted of violent crimes are under the influence of alcohol at the time of the offense (Lettieri, 1992); and there is a strong association between usual alcohol intake and domestic violence (Kantor & Straus, 1990).

Within the Department of Defense (DoD), more than 10,000 new cases of alcoholism are treated each year in military hospitals and residential treatment facilities (Grodin, 1991). A "typical" active-duty death from other than natural causes has been described as "a 27-year-old enlisted male who has some detectable blood ethanol 53% of the time" (Clark, Campagnari, & Jones, 1985, p. 487). But the problem is hardly limited to younger personnel. Researchers have found that rates of hospitalization for illnesses other than alcoholism per se are significantly higher among alcohol abusers versus controls throughout their service careers until retirement (Kolb & Gunderson, 1981)—at which point the Veterans Administration (VA) assumes the responsibility for providing necessary medical care.

Because alcohol abuse, like drug abuse, is considered to be incompatible with military readiness and performance, the DoD has established a comprehensive set of policies and programs designed to monitor and ultimately eliminate both drug and alcohol abuse among military personnel (Kallen, Grodin, & Vinet, 1989). In response to DoD directives in the 1970s, each of the services developed treatment programs targeting members with alcohol or drug problems (Bray, Marsden, Herbold, & Peterson, 1992). The emphasis on treatment for drug addiction was eventually superceded by a more punitive approach, with evident success: illicit drug use decreased dramatically following the introduction of urine testing and the "zero tolerance" policy, dropping from 27.6% of all military personnel reporting use of illicit drugs in 1980 to 3.4% reporting such usage in 1992 (Bray, Kroutil, et al., 1992). With illicit drug use nearly eliminated, the military is focusing on reducing alcohol abuse and its attendant problems.

Educational, counseling, and outpatient treatment programs have proven adequate for many alcohol abusers, but inpatient treatment generally has been favored as the appropriate initial therapy for alcohol-dependent individuals (Finney & Moos, 1991; McCaul & Furst, 1994; Walsh et al., 1991). In its revision of the 3rd edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R), the American Psychiatric Association has set forth the following criteria for dependency, requiring that an individual exhibit problems in at least three of the following areas to be diagnosed as alcohol-dependent: drinking larger amounts over longer periods of time than intended; a desire to, but unsuccessful efforts to, reduce alcohol use; continued drinking despite problems; spending a great deal of time in obtaining, consuming, or recovering from alcohol; alcohol use interfering with ability to carry out major obligations; giving up or reducing important social, occupational, or recreational activities; evidence of marked tolerance; evidence of characteristic withdrawal symptoms; and use of other substances to avoid withdrawal symptoms (American Psychiatric Association, 1987).

The U.S. Navy operates the largest inpatient alcohol treatment program of the three services, accounting for almost half of all active-duty alcohol inpatients DoD-wide. The Navy provides treatment through three (formerly four) large, free-standing Alcohol Rehabilitation Centers (ARCs) and a number of hospital-based Alcohol Rehabilitation Departments (ARDs). Their 6-week residential program is based on the 12-step principles of Alcoholics Anonymous (AA). Due to the nature of the patient population and the context in which treatment is offered, the Navy program differs in several respects from comparable treatment programs in the private sector. Perhaps most notably, referral and treatment are in some sense coerced. Refusal to enter treatment when recommended, and/or failure to complete treatment (either by choice or expulsion), can result in separation from naval service. Patients who are self-referred (as opposed to being identified by a higher authority) may nevertheless run the risk of damaging their careers, since treatment is documented in their military records. Another difference is that within the naval health-care system, neither the type nor the location of treatment are optional; the AA model is ubiquitous, and members are usually ordered to the most geographically convenient facility with space available. Finally, the majority of patients enrolled in Navy programs are young and male, reflecting both the preponderant demographic makeup of the Navy and the fact that individuals are often identified and referred because of alcohol-related behavior problems typical of young male drinkers in the larger culture (Cahalan, 1970).

Despite these constraining conditions—or perhaps because of them—the Navy's residential treatment program has been deemed a cost-effective alternative to the likely other option available under DoD policy: separation from service and subsequent replacement of that individual in the naval work force (Devine, Bishop, & Mensch, 1989). At a calculated cost-benefit ratio of more than 13:1 for alcohol treatment, the Navy seems well-justified in maintaining its present rehabilitation program (Devine, Bishop, & Mensch, 1989). Yet concerns about health-care costs, military entitlement benefits, and resource downsizing, along with new research suggesting the cost-effectiveness of both shorter inpatient stays and innovative outpatient treatment alternatives (McCaul & Furst, 1994; Miller & Hester, 1986), have prompted the Navy to consider reducing its standard length of stay for alcohol rehabilitation from 6 weeks to 4 weeks.

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In 1991, the Bureau of Naval Personnel (BUPERS) and the Bureau of Medicine and Surgery (BUMED) jointly requested that an in-depth study be conducted to determine whether such a reduction in treatment time could be accomplished without a significant loss of efficacy in outcome. In addition to the primary question regarding program length of stay, two ancillary issues were identified. First, what are the predictors of treatment success for this Navy patient population? And second, do those predictors interact with length of stay to differentially determine outcome?

Numerous research and evaluation studies have focused on correlates of treatment outcome, though the patient population, type of treatment, predictor variables, and outcome measures have differed from study to study, and findings have, not surprisingly, been inconsistent. Researchers are beginning to recognize that abstinence, though it remains the goal of most treatment centers and is considered to be the cardinal treatment outcome measure, is not the only meaningful criterion of treatment success (Schneider, Kviz, Isola, & Filstead, 1995). Rather, outcome should be evaluated using multiple measures of posttreatment status, such as occupational functioning, physical health, psychological adjustment, social relationships, and legal problems, as well as amount of alcohol use (Babor, Dolinsky, Rounsaville, & Jaffe, 1988; McLellan, Luborsky, Woody, O'Brien, & Kron, 1981; O'Brien, 1994; U.S. DHHS, 1990; Wright, Grodin, & Harig, 1990).

A wide array of patient characteristics and treatment variables have been studied with respect to these various outcomes, with sometimes conflicting results. Demographic characteristics such as age, paygrade/socioeconomic level, and marital status have generally been predictive of outcome (Kolb, Pugh, & Gunderson, 1978; Kruzich, MacDonough, Hawkins, & Silsby, 1986; Moos, Finney, & Cronkite, 1990; Pokorny, Miller, Kanas, & Valles, 1973; Schneider et al., 1995; Wright et al., 1990), but not always (Bullock, Reed, & Grant, 1992; Pattison, 1982). Family history (e.g., parental alcoholism), personal background (e.g., age of first drink, legal infractions), and clinical variables (e.g., dependency, quantity of alcohol intake, psychological problems) also also have been associated with outcome (Babor et al., 1992; Kolb et al., 1978; U.S. DHHS, 1990; McLellan, Luborsky, Woody, O'Brien, & Druley, 1983; O'Brien, 1994; Polich, Armor, & Braiker, 1980; Schuckit, Gunderson, Heckman, & Kolb, 1976), though again, not always (Wright et al., 1990; Moos & Finney, 1983).

While treatment variables can include treatment type (e.g., behavioral, cognitive, milieu), mode of delivery (e.g., inpatient, outpatient), program elements (e.g., individual counseling, education, family therapy), program length, and aftercare, only length of stay and aftercare are germane to the Navy's current concerns. Reviews of studies of treatment length have produced mixed findings with respect to outcome (Hertzman, Thomas, & Bishop, 1990; Miller & Hester, 1986). Studies of posttreatment care generally indicate that aftercare is associated with rehabilitation success (Ahles, Schlundt, Prue, & Rychtarik, 1983; Ito & Donovan, 1986; Walker, Donovan, Kivlahan, & O'Leary, 1983), though some authors report that aftercare has little or no effect (DuBourg, 1969; Imber, Schultz, Funderburk, Allen, & Flamer, 1976; Kirk & Masi, 1978).

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As the Navy considers transitioning to alternative treatment modalities, policy makers need information regarding current success rates and the determinants of salient treatment outcomes. Such information will serve as a baseline against which to measure new approaches, such as a shortened length of stay. Earlier research at the Tri-Service Alcoholism Recovery Department (TRISARD) in the Bethesda (Maryland) Naval Hospital used commanding officers' reports of posttreatment job performance as well as reports from aftercare personnel to determine rehabilitation success rates for 722 military personnel (Wright et al., 1990). The reported success rates were quite high: 77% of treatment program graduates were "totally successful" on all outcome measures, and 63% of those who did *not* complete treatment were nevertheless rated as totally successful. Success was related to military rank (paygrade), completion of treatment, and compliance with aftercare.

The present study sought to expand on this earlier work by examining a larger pool of potential predictors and outcomes, as well as by focusing specifically on Navy personnel. Such focus may be important, since the Navy is unique in some of the posttreatment stressors with which new program graduates must cope, such as shipboard living conditions, lengthy deployments and family separations, and concomitant discontinuity in aftercare support. This paper is the first of two reports which together will respond to the BUPERS/BUMED request for an in-depth study of the predictors of treatment outcome and the relative efficacy of a shorter length of stay. The objectives of this first report are to (a) describe the characteristics of program enrollees in terms of demographic composition, personal background, and clinical presentation at intake; (b) assess the effectiveness of the Navy's standard 6-week alcohol rehabilitation program in terms of several important, Navy-relevant outcomes; and (c) determine which baseline factors are predictive of treatment success after one year.

Method

Sample

In 1991, the Navy operated 25 residential alcohol rehabilitation facilities worldwide. Twelve of these facilities (4 ARCs, 8 ARDs) participated in the evaluation. All patients presenting for treatment at the participating facilities between February 1992 and March 1993 constituted the pool of potential research participants. To be eligible for the research study, patients had to meet the following criteria: (1) active-duty member of the U.S. Navy, (2) one year or more of service completed, (3) at least one year of obligated service remaining, (4) primary treatment for alcohol abuse/dependency (with or without other drug problem), (5) no major psychiatric disorder, and (6) first-time enrollee in the Navy inpatient program. Participation in the study was voluntary. A total of 1,380 participants (90% of all eligible patients) consented to provide data for the evaluation. Demographic composition of the sample is described in the Results section.

Treatment Program

The residential alcohol treatment program is generally reserved for personnel who are career-designated, or whom Navy administrators consider to have strong potential for making a useful

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contribution through continued service. When such service members have been identified as having a "drinking problem," they are generally issued military orders to report for treatment to a designated facility. An individual can be ordered to treatment regardless of whether he/she has voluntarily requested such assistance (Kallen et al., 1989). Thus, while participation in the research study was voluntary, enrollment in the treatment program itself might not have been.

The treatment facilities all operated a 6-week, open-format, milieu-based rehabilitation program centered around AA philosophy and practices. Within this structure, treatment directors were free to develop their own curricula, though basic curriculum elements were similar across facilities. The majority of time was devoted to AA-model meetings; secondary emphasis was placed on small-group therapy and didactic educational activities (e.g., lectures, videos), with remaining time divided among numerous other activities, such as physical training, Big Book study, field trips, large community meetings, journal writing, self-help, and free time. As an adjuvant to therapy, disulfirum (Antabuse) was prescribed for some of the patients, most often in the hospital-based ARD programs. Twelve months of aftercare were required for all program graduates.

Treatment staff personnel traditionally have included both military and civilian workers, some of whom are recovered alcoholics. Counselors receive instruction in the Navy's counselor training program, so that a common philosophy and approach to treatment are established. In addition, every Navy command is required to have a Drug and Alcohol Program Advisor (DAPA) to serve as aftercare coordinator for program graduates. DAPAs also receive training for their positions, but while they are a source of support and information for members in aftercare, they are not clinical counselors and do not provide therapy.

Instruments

Seven baseline questionnaires, four follow-up questionnaires, and the Navy's master personnel tapes were used to accomplish data collection. These instruments are described briefly in the following sections.

Baseline

Intake Questionnaire. Staff personnel completed this one-page form when a patient entered the treatment program. The form provided demographic, background, and diagnostic data.

Exit Questionnaire. The one-page, staff-provided Exit Questionnaire was completed when the patient was discharged from treatment and included information regarding length of stay, Antabuse, and prognosis.

Items for the Intake and Exit Questionnaires were drawn from the Navy's standard Alcohol and Drug Management Information Tracking System (ADMITS) form and the Drug and Alcohol Abuse Report (DAAR) and tailored to the needs of the study. Whereas facility counselors

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completed the Intake and Exit Questionnaires, the participants themselves completed the remaining five baseline questionnaires.

Alcohol Use Inventory (AUI). The Alcohol Use Inventory (AUI) is a clinical assessment tool designed to measure various features of the respondent's involvement with alcohol, such as quantity of consumption, motivational factors, drinking style and patterns, and alcohol-related problems (Horn and Wanberg, 1969; Horn, Wanberg, & Foster, 1990). The 228 multiple-choice items have been factored into 24 scales (17 primary, 6 second-level, and 1 general), each rendering a score on some aspect of the respondent's use of alcohol. Normative internal consistency reliabilities (Cronbach's alpha) for the scales ranged from .54 to .93; one-week test-retest reliabilities ranged from .54 to .89. Other psychometric properties of the AUI scales are presented in detail in the scoring manual (Horn et al., 1990).

Symptom Checklist (SCL-90-R). The SCL-90-R is a 90-item self-report inventory of psychological symptoms (Derogatis, 1983; Derogatis, Rickels, & Rock, 1976). Each item (e.g., "Feeling inferior to others," "Having to check and double-check what you do") is rated on a 5-point Likert-type scale of distress, ranging from "Not at all" to "Extremely." The items have been factored into nine primary dimensions of psychiatric symptomatology and three global indices of distress. Normative internal consistency coefficients for the nine symptom dimensions ranged from .77 to .90; test-retest correlations ranged from .78 to .90 (Derogatis, 1983).

Healthier People Health Risk Appraisal. This questionnaire, designed and published by the Carter Center of Emory University, finds its primary application as a health promotion and education tool. It was used in the present context to obtain general information about the participants' health status and lifestyle habits.

Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q). The Q-LES-Q measures the degree of enjoyment and satisfaction experienced by the respondent in seven areas of daily functioning: physical health, subjective feelings, work, household duties, social relationships, leisure time activities, and school/course work (if applicable) (Endicott, Nee, Harrison, & Blumenthal, 1993). A 16-item overall satisfaction scale also is included in the survey. Items are answered on a 5-point Likert-type scale to denote the degree to which the respondent "Enjoyed talking with co-workers or neighbors," "Kept up with expected work," and so forth. Responses to the items within each of the life activities domains are summed together, then divided by the number of items to produce the scale scores. Kuder-Richardson internal consistency reliabilities in the validation sample ranged from .90 to .93; test-retest reliabilities ranged from .63 to .89 (Endicott et al., 1993).

Family Questionnaire. BUPERS and BUMED administrative personnel compiled this instrument to answer questions of particular interest to Navy Drug and Alcohol Program directors and counselors. Items focused on the patient's family background, including parental aggression and use of alcohol.

Follow-Up

Participants completed two of the four one-year follow-up questionnaires; the participant's DAPA answered the third form, and the participant's work supervisor completed the fourth.

Confidential One-Year Follow-Up Questionnaire. This participant-provided instrument measured alcohol use, alcohol-related problems, satisfaction with treatment, participation in aftercare, and general lifestyle behaviors at follow-up.

Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q). Participants completed the Q-LES-Q again at follow-up to report their quality of life at one year posttreatment. Instructions and wording on the questionnaire were changed as appropriate to refer to the time period following treatment, rather than to the period prior to admission.

Confidential DAPA Record. This one-page, DAPA-provided form requested information concerning the participant's drinking behavior, aftercare attendance, use of Antabuse, compliance with the recovery program, and alcohol-related incidents occurring during the year following treatment.

Supervisor's Assessment of Treatment Effectiveness. The supervisor's two-page questionnaire was used to evaluate the participant's job performance and to report any alcohol-related problems (e.g., late for work due to alcohol abuse, legal/disciplinary incident) that the supervisor had either observed directly or become aware of during the year posttreatment. The questionnaire was a modified version of a standard BUMED reporting form used in the TRISARD study (Wright et al., 1990).

Enlisted and Officer Master Files. The Navy's computerized master personnel tapes were used to track participants during follow-up and to determine the date and reason for discharge for individuals leaving the service within one year after treatment.

Procedure

Baseline Data Collection

The baseline data forms were collated into individual packets (one set of questionnaires per participant), and an appropriate supply of packets was furnished to each of the participating treatment facilities. Supplies were replenished periodically as needed. Facilities were also provided with detailed written instructions describing the study design, data collection procedures, and each of the data collection instruments.

Staff members at each facility screened all incoming patients for eligibility in the evaluation. Patients who met the eligibility requirements were invited to participate in the study; those who did not qualify for inclusion continued in the regular treatment program with their cohorts. After explaining the purpose of the study, describing the procedures involved, and assuring the patient

of strict confidentiality, a staff member provided the eligible volunteer with a detailed consent form to sign. Refusals were honored without repercussion, and patients who chose not to participate in the study continued in the regular treatment program.

Program counselors completed an Intake Questionnaire for all study volunteers and administered the initial (baseline) set of participant questionnaires. All of the questionnaires except the Family Questionnaire were administered during the first week in treatment, usually within the first two days. It was recommended that the lengthy AUI be administered separately so that respondents did not become fatigued. The Family Questionnaire was administered sometime after the third week to give participants time to work through denial and begin to address family issues. Except for these guidelines and the standard instructions accompanying each instrument, it remained at the discretion of each facility to decide the most convenient and appropriate times to administer the necessary questionnaires. Either individual or group administration was acceptable, as long as a counselor was available to answer questions, clarify items, and check the questionnaires as they were turned in to make sure that they had been completed properly.

When a patient left treatment, the counselor completed the Exit Questionnaire and returned the entire packet of baseline questionnaires to the Naval Health Research Center (NHRC). Intake and Exit forms were completed for all patients who had consented to participate in the study, regardless of whether the patient completed the treatment program or the full complement of baseline questionnaires. Thus, even participants who were discharged within a few days because of an unexpected change of orders or because they were "not amenable" to treatment were included in the evaluation.

Follow-Up Data Collection

As soon as a participant's baseline questionnaire packet was received at NHRC, indicating that the individual had left treatment, the DAPA follow-up questionnaire was mailed to the participant's receiving command. It was requested that the form be retained for one year, with entries made when timely (e.g., date and brief description of any alcohol-related incident), then returned to NHRC after 12 months. However, were the individual discharged from the Navy or transferred to another command before the end of the year, the form was to be completed to the best of the DAPA's ability and returned to NHRC immediately. When a member was transferred, a new DAPA form was mailed to the new receiving command with the same instructions. These procedures were designed to ensure continuity of follow-up and to obtain the most complete DAPA-provided information possible for the participant's full year posttreatment.

At the end of 12 months following a participant's discharge from treatment, a courtesy reminder was mailed to the DAPA, along with the two participant follow-up questionnaires. Instructions requested that the DAPA administer the follow-up questionnaires to the participant and return them, along with the completed DAPA form, to NHRC. It was hoped that distributing the participant questionnaires through the DAPA rather than mailing them directly to the participant would improve the return rate. However, to ensure confidentiality, the participant was

directed to seal his/her completed questionnaires in a separate privacy envelope that was provided before returning them to the DAPA.

Also at the end of 12 months, the Supervisor's Assessment of Treatment Effectiveness was mailed under separate cover to the participant's commanding officer, with the request that it be completed by the individual's immediate supervisor (or most appropriate source of work-related information) and returned to NHRC.

If any follow-up questionnaires were not returned to NHRC within a month of their due date, a courtesy reminder, along with another set of questionnaires, was mailed to the nonresponding command requesting timely compliance.

Independent and Dependent Measures

The intent of this first study was to explore the relationships among a number of potential predictor variables and several different outcome measures. To this end, the psychometric instruments previously described provided hundreds of raw data elements. Initial analyses were therefore designed to reduce this multiplicity to a manageable and coherent set of core variables. Reduction was accomplished primarily by four means: (1) selecting variables of theoretical or practical importance, (2) eliminating variables that were highly intercorrelated with similar variables (e.g., age and paygrade), (3) aggregating variables into more global measures or scales, and (4) eliminating pretreatment variables that showed little or no relationship to the outcomes of interest. The resulting pool of independent and dependent variables are described as follows.

Independent Variables

Twenty-four independent variables representing four predictor domains were included in the main analyses. These core variables were selected on the basis of previous research indicating potentially significant associations between them and treatment outcomes. Variables of secondary interest were examined in some of the descriptive procedures but were not included in predictive analyses.

The domain of demographic variables included the participant's paygrade, gender, race, education, marital status, and number of children living at home. Because paygrade is correlated with a variety of common socioeconomic indicators, such as age, number of years of service, income, education, social status, and occupational level, it is commonly used as a proxy for these variables in research with military populations (Emrick & Hansen, 1983).

Eight personal background variables tapped aspects of the participant's family background and salient personal history, including (1) coming from a broken home, (2) having an immediate family member who had been treated for alcoholism, (3) having a parent with a perceived alcohol problem, (4) having been abused (physically, emotionally, or sexually) as a child, (5) age of first alcoholic drink, (6) record of legal or disciplinary problems, (7) previous treatment for alcoholism, and (8) involvement in satisfactory social relationships. Variables 1, 4, and 6 were

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provided by the counselors on the Intake and Exit forms; variables 2, 3, 5, 7, and 8 were drawn from the baseline participant questionnaires. Variable 3, having a parent with a perceived alcohol problem, was a continuous variable computed as the sum of "yes" responses to a list of 30 questions on the Family Questionnaire concerning parental use of alcohol. Items addressed the patient's perceptions ("Have you ever thought that one of your parents had a drinking problem?"), feelings ("Did you ever feel like hiding or emptying a parent's bottle of liquor?"), and experiences ("Did a parent ever yell at or hit you or other family members when drinking?") with respect to a parent's drinking behavior. Variable 8, experiencing satisfactory social relationships, was measured by the 5-point social relationships composite score on the baseline Q-LES-Q.

Six variables were used to capture the participant's clinical profile at entry into treatment: detoxification (yes/no), treatment category (alcohol only vs. polydrug with alcohol primary), alcohol intake, global AUI alcohol involvement score (ALCINVOL), SCL-90-R global severity index (GSI) of psychiatric symptomatology, and severity of alcohol dependence. Alcohol intake was estimated using a "30-day/beverage type" quantity-frequency index that has been found to be one of the most efficacious self-report measures of alcohol intake (Embree & Whitehead, 1993). It was computed by summing the number of drinks of beer, wine, and/or liquor consumed on a typical drinking day (i.e., a 24-hour period when alcohol was used), then multiplying that sum by the usual number of drinking days per month. Severity of dependence was based on the six DSM-II dependency symptoms that Polich et al. (1980) found to be strongly associated with a poor prognosis: tremors, morning drinking, loss of control of drinking, blackouts, missing meals, and continuous drinking. Responses to items on the AUI related to these six behaviors were used to assign a score of 1 ("yes") or 0 ("no") to each symptom. The severity index was produced by summing the six symptom scores. Incomplete data on any of the six component scores resulted in missing data for the severity index.

Although the content of the treatment program was essentially the same for all patients, four treatment factors were included in analyses because of their variability and potential impact on outcome. These were length of stay (number of days in treatment), successful completion of treatment, posttreatment use of Antabuse, and number of months of aftercare attendance. While the standard length of treatment in the Navy program is 6 weeks, actual length of stay is determined by the counselors in view of an individual's progress. If a patient is ready for discharge after only 4 or 5 weeks, he/she is discharged accordingly as having successfully completed treatment; conversely, an individual requiring extended treatment is retained for the length of time needed. Other circumstances can affect length of stay as well. Some patients must leave treatment prematurely because of personal emergencies or unanticipated transfers (e.g., orders to report to their ship for deployment). Others are discharged as treatment failures, whether after one or two days or a nearly complete term in the program. Individuals who fail treatment are usually classified as not amenable, though a few are terminated for unauthorized absence from program activities.

Dependent Variables

Four primary outcome domains were selected on the basis of their relevance to Navy alcohol program administrators and policy makers. These were (1) retention on active duty; (2) amount of alcohol use; (3) adverse behavior, particularly alcohol-related incidents; and (4) job performance. A fifth domain, quality of life, was included as an outcome area of interest, with the caveat that the breadth and subjectivity of such a criterion made it categorically different from the other four. Seven dependent variables captured these outcome domains, as follows:

Retention on active duty was assessed in terms of discharges occurring within one year after treatment. Two discharge measures were used to reflect both length of retention prior to discharge and reason for separation. Time to discharge was computed as the number of days between discharge from treatment and discharge from service. Because members still on active duty after one year were omitted from this computation, time to discharge was blocked into a 5-point categorical scale: 0 to 3 months (scored 1), 4 to 6 months, 7 to 9 months, 10 to 12 months, and not discharged within one year (scored 5). Reason for discharge was based on the official DoD loss code entered into an individual's personnel record. Codes were grouped into the following discharge categories: alcohol-related, drug-related, misconduct (other than alcohol- or drug-related), personality disorder, and other reasons. For most analyses, these groups were further consolidated into a dichotomous variable indicating pejorative discharge (alcohol/drug/misconduct, scored 1), versus nonpejorative reason (personality disorder/other reason, scored 0).

The primary measure of alcohol use at follow-up was the DAPA item, "Has the person been drinking since leaving treatment?" Responses ranged from 1 ("Totally abstinent") to 5 ("Drinks very heavily"); for most analyses involving abstinence as a dichotomous outcome (drinking vs. not drinking), responses 1 ("Totally abstinent") and 2 ("Essentially abstinent (a couple of 'slips')") were combined to indicate abstinence.

Both the DAPA and the supervisor reported alcohol-related events and misconduct occurring during the year following treatment. These included alcohol-related illnesses, work-related problems (such as missing work due to alcohol use), and "showing any indication that [the participant] had resumed drinking" or was using other drugs, as well as legal/disciplinary actions. A negative incidents score was computed by summing the number of alcohol-related events that the DAPA reported and the number of problems that the supervisor reported. Maximum possible score on the supervisor's 12-item checklist of adverse occurrences was 12; maximum number of incidents reported on the open-ended DAPA form was three (DAPA-reported infractions were usually serious and frequently led to the individual's separation from service). Thus, the possible range of scores on the follow-up measure of negative incidents was 0 to 15. The aggregate score was not weighted to take into consideration the seriousness of an alcohol-related event. Thus, for example, being late to work because of drinking counted equally with a drunk driving arrest.

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Two items on the Supervisor's Assessment form provided two separate indicators of job performance. These were (1) "If eligible, was the member recommended for reenlistment or advancement/promotion?" and (2) "Is member's current job performance (a) highly satisfactory, (b) satisfactory, (c) marginal, or (d) unsatisfactory?" Supervisors were also asked whether the eligible member had actually been reenlisted or promoted.

Quality of life was operationalized as the summary satisfaction scale on the follow-up Q-LES-Q. This score ranged from 1 ("Very poor") to 5 ("Very good"), indicating the degree of overall life satisfaction experienced.

Statistical Analyses

Results are presented in five sections. The first three employ primarily descriptive statistics to characterize the sample on the various prognostic variables and criterion measures and to examine follow-up response rates. Comparative statistics (e.g., chi-square, t-test) are presented when appropriate. The fourth section explores predictors and outcomes within selected subgroups, using chi-square analyses and independent-samples t-tests for between-groups comparisons. The final section presents results from correlational and multiple regression analyses of relevant predictors with the main criterion measures. Variables were selected for the regression equations by first performing Pearson product-moment correlational analyses between the full complement of independent and dependent variables. Any independent variable that correlated at $p \leq .01$ with at least one outcome measure was retained for the regression analyses. Because of the large sample size and number of variables involved in the evaluation, the .01 alpha level was selected a priori as the criterion for significance in all comparative and predictive analyses.

Results

Prognostic Indicators

Sample Demographics

Participants were predominantly male (95%), with a mean age of 26.7 years. One third (34%) of the patients were married, half (50%) were single, and the remaining 16% were separated, divorced, or widowed. Fewer than half (46%) had children living with them at home, the average number being one child. Racial distribution of the sample was approximately 79% white, 12% black, 2% American Indian/Alaskan, 2% Asian/Pacific Islander, and 5% other ethnic background. The predominant educational level was high-school graduate (72%); 6% had less than 12 years of formal schooling, while 22% had more than 12 years. The vast majority of participants were enlisted personnel: 30% E1-E3, 61% E4-E6, and 6% E7-E9; fewer than 3% were officers. Average paygrade level was between E-4 and E-5 (typical annual salary = $36,500). Average length of naval service was 6.5 years.

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Personal Background Variables

Although only 21% of the patients were from a family in which an immediate family member had been treated for alcoholism, nearly 59% had lived with a parent or guardian with an apparent alcohol problem (see Table 1). Parental drinking was determined by a score of 1 or higher on the Family Questionnaire parental alcohol scale, the average number of positive ("yes") responses on the 30-item scale being seven. The patients had also experienced a difficult and disruptive childhood. Approximately 54% had come from a broken home, and 45% had been abused as children. Reported abuse differed by gender, with 43% of the men and 68% of the women reporting some form of childhood abuse. Of these, 19% of the men and 31% of the women reported being physically abused; 36% of the men and 51% of the women were emotionally abused; and 7% of the men and 45% of the women had been sexually abused. Respondents had had their first alcoholic drink at the average age of 13.6 years.

Table 1. Percentage of patients with positive ("yes") scores on personal background variables.

Background variable	% Yes
Record of disciplinary problems/judicial actions	68.5
Parent/guardian with alcohol problem	58.5
Patient from broken home	54.0
Abused as a child	44.5
Previous treatment for alcoholism	24.5
Family member treated for alcoholism	21.1

Behavior problems were common. Almost 69% of the sample entered treatment with a history of legal or disciplinary infractions, such as preservice arrest, court-martial, or nonjudicial punishment (NJP). The average number of such incidents was two, with a maximum of 11 reported. Three fourths (75%) of the patients had been referred to treatment by a military authority, as opposed to being self-referred. One fourth of the sample (25%) had been treated previously for alcoholism, mostly in outpatient programs. Yet in spite of this background, the participants were reasonably satisfied with their social relationships. Mean score on the Q-LES-Q social relationships scale was 3.8 on a 5-point scale, indicating that they enjoyed their social interactions with friends, relatives, and acquaintances "most of the time."

Clinical Presentation Measures

Alcohol intake and chemical detoxification. When the participants entered treatment, they were drinking heavily—approximately 12.3 drinks per drinking day—and frequently—14.2 drinking days per month, or an average of 3 to 4 days per week. These figures reveal more alcohol use than would usually be seen among heavy weekend drinkers, indicating that considerable alcohol consumption was occurring during the work week as well. Most of the sample preferred beer and liquor to wine, with 91% consuming beer, 53% using liquor, and only 9% drinking wine. Alcohol intake was significantly related to paygrade ($F(3, 1335) = 7.22$, $p \leq .001$). Members of the lowest paygrades (E1-E3) were the heaviest drinkers, while officers drank the least. As illustrated in Figure 1, the same pattern was expressed whether measuring mean drinks per drinking day or averaging the number of drinks in a one-month period over 30.5 days. Thus, although officers were drinking about one third fewer drinks per drinking occasion than were the E1-E3 enlisted members (9.5 vs. 14 drinks, respectively), they were drinking almost as often—13 days per month, versus 15 days for the E1-E3s. Despite this volume of alcohol intake, only 85 of the 1,380 patients (6%) required chemical detoxification prior to entering the regular treatment program. Seventy-three individuals (5%) were polydependent; of these, six were in the detoxification group. Approximately 9% of the sample were abstinent when they reported for treatment.
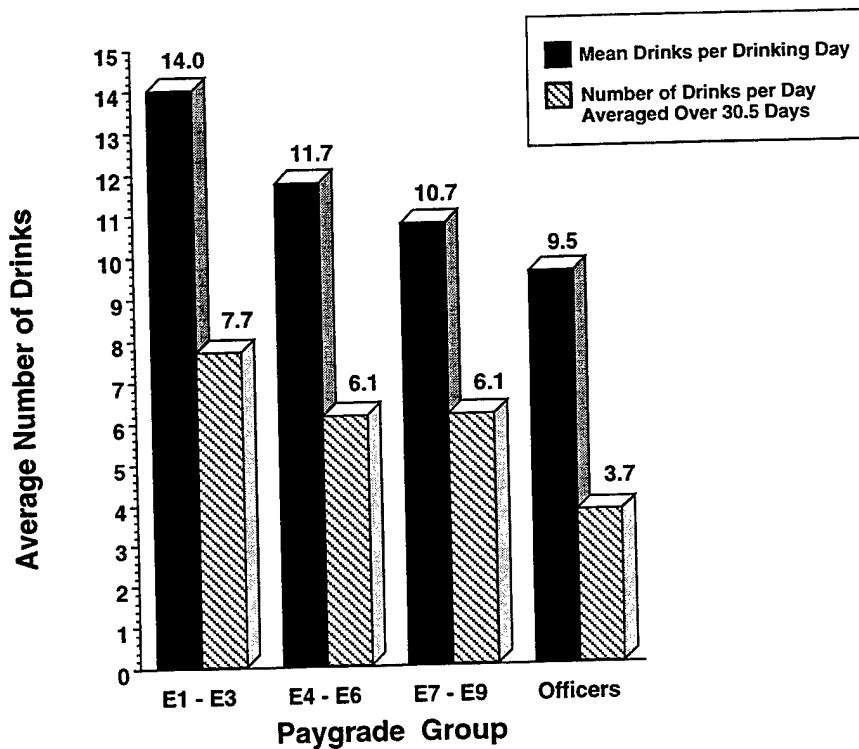
Figure 1. Average number of alcoholic drinks per day by paygrade, measured at entry into treatment.

Alcoholism score. The AUI general factor ALCINVOL (Alcohol Involvement) scale is used as an overall measure of alcoholism/alcohol dependency. Maximum possible score on the ALCINVOL scale is 68; minimum possible score is 0. Figure 2 compares mean ALCINVOL scores for the Navy and three other alcohol inpatient cohorts, including the civilian sample on which the AUI normative values were computed during the late 1970s. The standardization sample consisted of 1,290 first-time admissions to an inpatient alcoholism treatment program in Denver, Colorado. Mean age for the sample was 38.2 years; approximately 15% were women. The other two cohorts represented in Figure 2 were a large group of alcohol patients at a VA Hospital ($N = 1,027$) and a sample of 477 patients admitted to a 2-week inpatient treatment program in a private hospital (Horn et al., 1990). All three samples were drawn from the same time period and geographical region. Mean ALCINVOL score for the Navy ($n = 1,329$) was 20.2 ($SD = 11.3$), with a range of 0.0 to 57.0. Means and standard deviations for the other three cohorts were 35.2 (16.2), 33.9 (15.1), and 31.1 (12.1) for the normative group, VA hospital, and private hospital, respectively. Between-groups comparisons confirmed that the Navy's ALCINVOL score was significantly lower than those of the other three samples ($t(2,617) = -27.55$, $t(2,354) = -25.19$, and $t(1,804) = -17.73$ for the normative group, VA, and private hospital, respectively, all $p \leq .001$), indicating relatively less severe alcoholism.
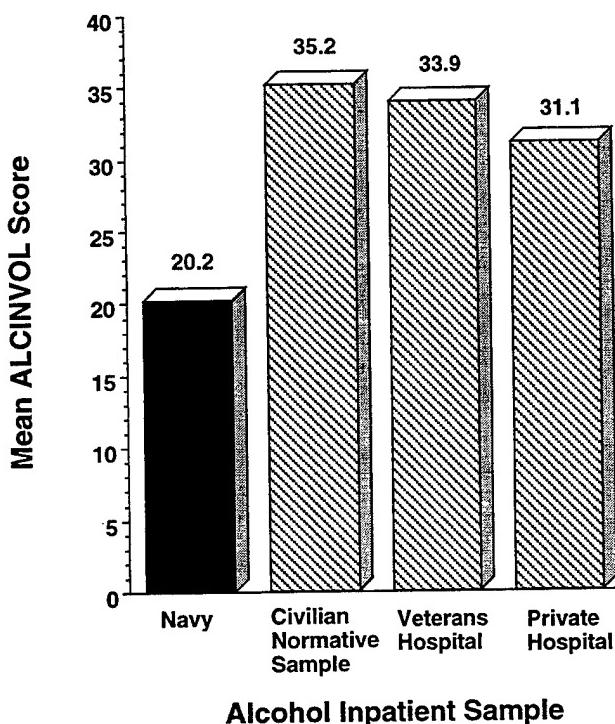
Figure 2.   Alcohol Use Inventory (AUI) general alcohol involvement scale
for Navy sample and three other inpatient cohorts.

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Severity index. Table 2 presents participant responses to the six items comprising the severity of dependence measure based on the work of Polich et al. (1980). More than three fourths of the sample (77%) had experienced blackouts as a result of drinking, and approximately 82% reported an inability to stop drinking once they had begun (loss of control). More than half (58%) engaged in lengthy periods of continuous or binge drinking of 2 days or more; the same percentage reported missing meals when drinking. More than one third of the sample (37%) had experienced physical tremors after drinking, and about 28% engaged in morning drinking to relieve the effects of a hangover. To compute the severity index, positive responses were assigned a score of 1, negative responses were scored 0, and the six items were summed. Cronbach's alpha for the scale was .66. Mean severity index for the sample was 3.4 "yes" responses (range = 0 to 6).

Table 2. Percentage of patients reporting alcohol dependence symptoms at intake.

Item	% Yes
Do you lose control of your drinking?	81.6
Do you have blackouts?	77.4
Do you drink continuously? (2 days or more)	58.2
Do you miss meals?	58.2
Do you have tremors?	36.5
Do you drink in the morning?	27.5

Psychological dysfunction. The GSI (Global Severity Index) scale is the SCL-90-R general measure of psychological dysfunction. Maximum possible score on the GSI is 4.0; minimum possible score is 0. Figure 3 presents mean GSI scores for the Navy and four normative cohorts. The four cohorts consisted of (1) a sample of 974 nonpatient normal adults, mean age 46.0 years, 51% male; (2) a group of 806 adolescent nonpatients, mean age 15.6 years, 41% male; (3) a large cohort of 1,002 psychiatric outpatients, mean age 31.2 years, 42% male; and (4) a smaller sample of 423 psychiatric inpatients, mean age 33.1 years, 37% male (Derogatis, 1983). The mean for the Navy sample (n = 1,364, 95% male) was .64 (SD = .54), ranging from 0.0 to 3.01. Means and standard deviations for the other four samples were .31 (.31), .76 (.54), 1.26 (.68), and 1.30 (.82) for the nonpatient normal, adolescent nonpatient, psychiatric outpatient, and psychiatric inpatient cohorts, respectively. The Navy's GSI score was significantly higher than that of the nonpatient normal adults (t(2,336) = 17.16, $p \leq .001$). But Navy patients manifested significantly less psychological distress than did the other three groups (t(2,168) = -5.00, t(2,364) = -24.70, and t(1,785) = -19.20 for comparisons with the adolescent nonpatients, psychiatric outpatients, and psychiatric inpatients, respectively, all $p \leq .001$).

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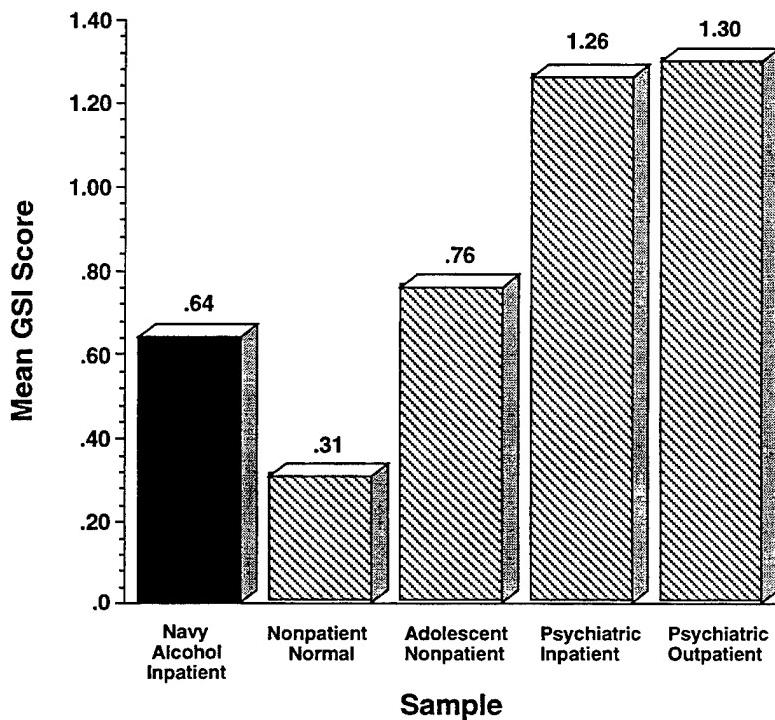
Figure 3. Symptom Checklist (SCL-90-R) global severity index (GSI) of psychiatric symptomatology for Navy sample and four other cohorts.

Treatment Variables

Completion of treatment. Approximately 89.6% of the sample successfully completed the treatment program, though the majority (74%) were given only a "Fair" to "Poor" prognosis. A few patients (1.6%) were returned to regular duty status or granted emergency leave before having the chance to finish treatment; these individuals were classified as noncompleters but not as treatment failures. Staff members determined the majority of noncompleters—8.6% of the sample—to be nonamenable to treatment and therefore considered treatment failures. An additional three individuals (0.2%) were removed from the program following an unauthorized absence and were also classified as treatment failures. Thus, a total of 10.4% of the participants did not complete treatment, but only 8.8% were designated treatment failures.

Length of stay. Mean length of stay in the treatment program was 40.7 days, with a range of 1 to 85 days. Among treatment completers, average length of stay was 42.1 days; average stay for noncompleters was 29.0 days. Approximately 14% of the patients were extended more than 3 days beyond the standard 6-week (42-day) treatment time frame, the average extension being one week.

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Antabuse. Antabuse was prescribed as a treatment component for about 15% of the patients during their residential stay and for 13% as part of their aftercare program. However, compliance with the prescribed regimen after leaving treatment was apparently low. According to DAPA observations, only about 17% of the participants for whom Antabuse had been prescribed had taken the drug during the aftercare period. The DAPAs do not dispense Antabuse or necessarily supervise its ingestion, however, so the accuracy of these particular reports may be open to challenge. In an attempt to validate these observations, a cross-tabulation of DAPA-reported versus self-reported use of Antabuse was performed, using follow-up respondents for whom the medication had been prescribed. Results indicated generally high concordance, with DAPAs and participants agreeing in 86% of the cases.

Aftercare. Most of the participants (89%) attended AA or comparable aftercare meetings for some length of time, ranging from 1 to 12 months. However, fewer than 29% attended for the full 12 months as prescribed, the average length of attendance being 8.3 months. While nearly all (93%) of the treatment completers attended some aftercare, the average attendance time being about 9 months, almost half (48%) of the noncompleters also attended aftercare meetings, for an average of about 3 months. Aftercare attendance, like alcohol intake, was linearly related to paygrade, with the lowest rates (E1-E3) exhibiting the shortest attendance time (mean = 6.5 months) and officers exhibiting the longest (mean = 10.7 months), $F(3, 791) = 17.15, p \leq .001$.

In addition to AA or similar support group meetings, participants are expected to conform to an individualized aftercare program that includes abstinence, regular meetings with the command DAPA, and specific activities designed to ensure continued work on personal problems, attitudes, and behavior. Therefore, the DAPAs were also asked how they would rate the member's overall compliance with his/her recovery program. Responses indicated that 67% of the participants demonstrated "Good" or "Excellent" compliance, while 33% were rated as "Fair" or "Poor."

Follow-Up Response Rates and Response Bias

Overall Response Rates

Follow-up response rates were calculated for each of the four follow-up questionnaires. Unadjusted rates were computed as the number of usable forms returned divided by the total number in the sample (N = 1,380). Adjusted rates were based on a divisor that reflected the number of *possible* returns. Thus, participants who left the Navy prior to the end of one year were subtracted from the two participant questionnaire divisors because they were no longer available to provide a response; however, they were not subtracted from the DAPA or supervisor questionnaire divisors because those officials were able to provide information on discharged individuals as well as on active-duty personnel. The DAPA and supervisor questionnaire response rates were similarly adjusted when a command was disestablished (e.g., ship decommissioning); in such cases, the participant's supervisory personnel could not be contacted because individual names of DAPAs, supervisors, or commanding officers were not known.

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The following are the return rates for the four questionnaires. The adjusted rate is presented first, followed by the unadjusted rate (in parentheses): (1) Confidential DAPA Record, 79.4% (77.4%); (2) Supervisor's Assessment of Treatment Effectiveness, 78.7% (74.9%); (3) Confidential One-Year Follow-Up Questionnaire, 60.5% (39.2%); (4) Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q), 58.0% (37.6%). Overall, follow-up data from one or more questionnaires were received for 84.3% of the sample. DAPA and/or supervisor questionnaires, which together provided data for four of the six objective outcome measures, were received for 83.8%; the remaining two objective outcomes were time to discharge and discharge code, which were obtained for all participants from computerized personnel records.

Although response rates this high are likely to ensure a representative picture of the sample at follow-up, the possibility of response bias must be considered. To examine this issue, the sample was divided into two groups: those participants for whom some amount of follow-up questionnaire data had been received, even if the participant had been discharged ("follow-up group"), and those for whom no follow-up questionnaires had been returned, regardless of the reason ("no follow-up"). The two groups were then compared on each of the independent variables except Antabuse compliance and participation in aftercare, both of which the DAPA questionnaire provided and thus existed only for the follow-up group. No significant differences were found on any of the 22 baseline measures examined, though one variable, length of stay, was borderline significant at $p \leq .03$ (the follow-up group was slightly higher than the no follow-up group, 40.9 days vs. 39.6 days, respectively). It was concluded that the follow-up cohort was representative of the entire sample in terms of demographic, background, clinical (at intake), and treatment characteristics.

Participant Respondents Versus Nonrespondents

The possibility of bias appeared greater with respect to the subjective, participant-provided questionnaires. While response rates among those participants who were still on active duty after one year were acceptable, a substantial proportion of the initial sample were either unable or unwilling to provide the requested self-report data at follow-up. Therefore, these two groups—participant respondents (who returned at least one of the two subjective questionnaires) and nonrespondents (who returned neither)—were compared on all 24 prognostic variables to determine whether the responding participants were representative of all participants at baseline.

Independent-samples t-tests and chi-square analyses revealed no statistically significant differences between the two groups on any of the eight personal background or six clinical profile variables at entry into treatment. The groups were similar demographically, as well, differing only on paygrade and marital status: respondents were slightly higher in rank than were nonrespondents (median paygrade = E-5 vs. E-4, respectively, $\chi^2(3) = 32.07, p \leq .001$), and 39% of the respondents were married, vs. 31% of nonrespondents ($\chi^2(1) = 7.63, p \leq .01$). With respect to treatment variables, respondents were more likely to have completed treatment (97%, vs. 85% of nonrespondents, $\chi^2(1) = 50.56, p \leq .001$); their stay in treatment was slightly longer (41.8 days vs. 40.0 days, $t(1,397) = 4.73, p \leq .001$); and they attended aftercare meetings for a longer period of time (9.8 months vs. 6.5 months, $t(793) = 10.39, p \leq .001$). However, these

factors are interdependent and may point to but a single difference, namely, compliance with the treatment protocol. Failure to complete treatment would result in a shorter length of stay and would in many cases lead to an early service discharge; early discharge, in turn, would limit the amount of time that an individual could participate in aftercare meetings. Thus, except for being slightly more senior in rank, somewhat more likely to be married, and more compliant with treatment, participants who completed and returned their follow-up questionnaires resembled nonrespondents in terms of a wide array of patient characteristics and were adequately representative of the initial baseline sample in those terms.

Criterion Measures

Retention (Discharges)

As shown in Figure 4, 29.5% of the total sample were discharged from naval service prior to the 12-month follow-up, nearly half of them within 6 months. The majority of these early discharges (about 61%) had occurred for undesirable reasons involving alcohol, drugs, or misconduct; a small number (2%) were due to a diagnosis of personality disorder. Of the remaining personnel discharged for "other reasons," many left the service for reasons related to the Navy's reduction in force, such as the Special Separation Bonus (SSB) program, early retirement, or general demobilization. The other most prevalent reason was completion of required active service (including transfers to the fleet reserve), suggesting either that the participants actually had less than one year of service time remaining when they entered treatment (despite one year being a criterion for inclusion in the study), or that the completion of required service discharge was granted early.

Figure 4 displays the reasons for discharge only for the 29.5% of the sample ($n = 407$) who did not remain on active duty for at least one year following treatment. When the analysis was recomputed on the full sample, results showed that about 18% of all participants had been discharged within one year for pejorative reasons, including 8% for alcohol, 2% for drugs, and 8% for misconduct. Thus, while more than a quarter of all early discharges were alcohol-related (see Figure 4), only 8% of all program participants were discharged before the end of 12 months for alcohol-related reasons.

Alcohol Use at Follow-Up

Figure 5 shows the degree of alcohol use at follow-up as reported by the DAPAs (reports cover less than one year for members who left the Navy before the end of 12 months). Approximately 68% of the participants were either totally or essentially abstinent, while 14% were drinking frequently or heavily. As was the case at baseline, alcohol use at follow-up was negatively related to paygrade. Figure 6 demonstrates that nearly twice as many of the most junior enlisted personnel (E1-E3) were using alcohol at follow-up relative to the midrange enlisted groups (E4-E9); compared to officers, five times as many E1-E3 sailors were drinking. Chi-square analysis confirmed that the differences were statistically significant ($\chi^2(3) = 49.16$, $p \leq .001$).

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Reasons for Discharge
(members discharged within one year)

Time to Discharge
(after leaving treatment)

0 - 3 Months	5.2%
4 - 6 Months	8.5%
7 - 9 Months	7.4%
10 - 12 Months	8.4%
Total Discharged Within One Year	29.5%

Personality Disorder 2.2
Drugs 7.6
Alcohol 26.8
Misconduct 27.0
Other Reasons 36.4
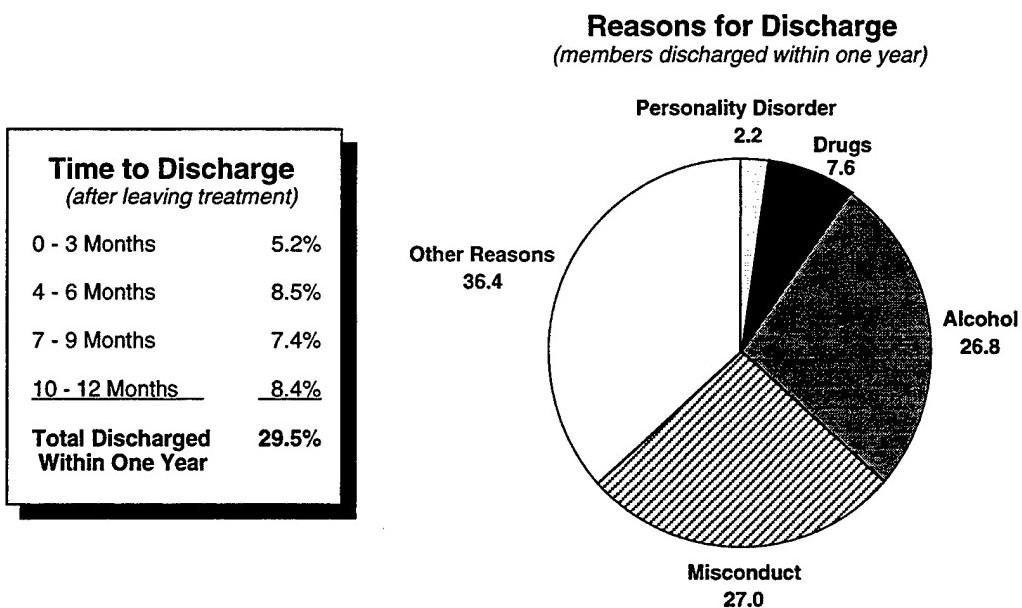
Figure 4. Time to discharge and reasons for discharge for participants leaving naval service within one year after treatment.

Drinks Very Heavily 6.0%
Drinks Frequently 7.9%
Drinks Occasionally 18.5%
Totally Abstinent 49.1%
Essentially Abstinent 18.5%
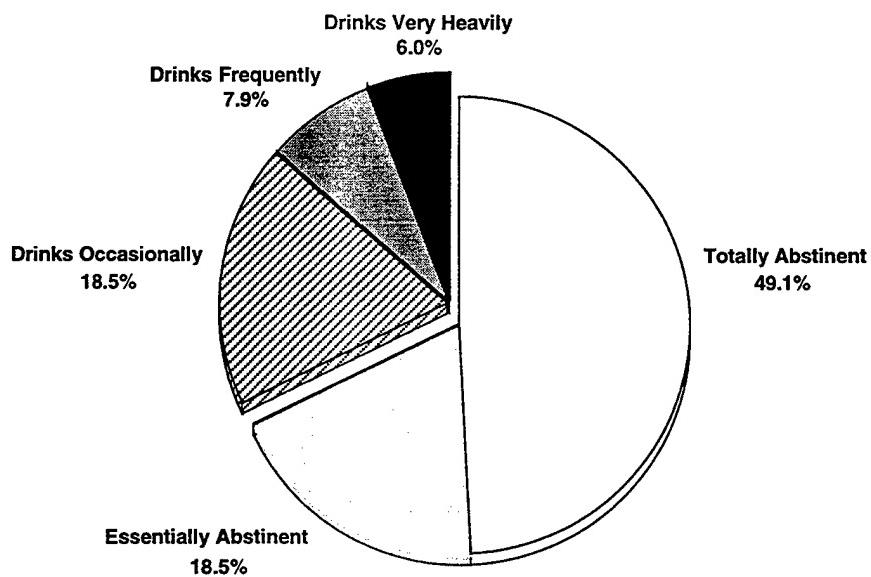
Figure 5. Alcohol use at 12-month follow-up.
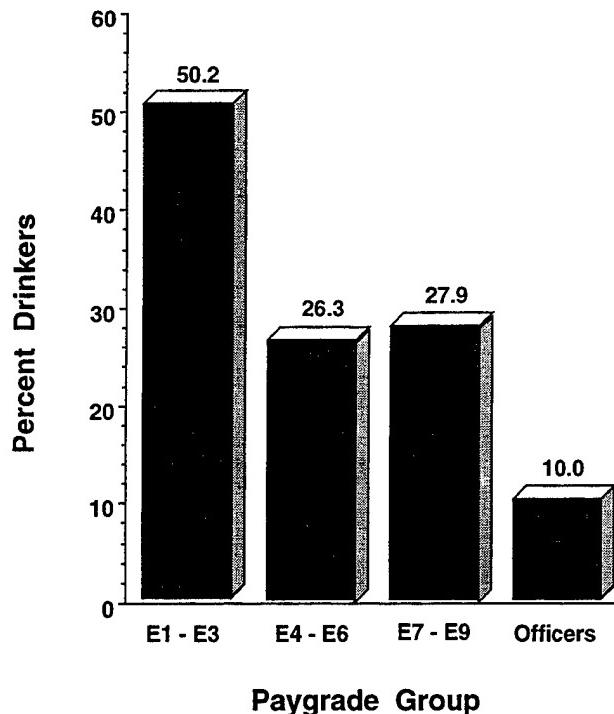
Figure 6. Percentage of drinkers at 12-month follow-up, by paygrade.

Self-reported alcohol intake was considerably lower than at baseline, even among nonabstinent personnel. Mean number of drinks per drinking day, reported by participant respondents on the Confidential One-Year Follow-Up questionnaire, was 2.9 drinks, compared with 12.1 drinks for the same individuals at baseline; their average number of drinking days per month was 1.6 days, versus 13.8 days at baseline. Among drinkers only (about 21% of the participant respondents), mean intake at follow-up was 5.7 drinks per drinking day on an average of 5.0 days per month. Only about 7% of the respondents who were using alcohol had resumed drinking immediately after leaving treatment. The remainder were somewhat evenly divided in their average time to first drink: 38% started drinking again within 1 to 3 months, 29% within 4 to 6 months, and 26% within 7 to 12 months after leaving treatment. This subgroup of responding participants might not be representative of the total sample at one year. However, these results indicate that many nonabstainers experienced a significant reduction in both the amount and frequency of alcohol use.

Negative Incidents

Often what brought a person into treatment was an alcohol-related incident or behavior problem (almost 69% of the sample had a history of disciplinary infractions at intake). At follow-up, about 42% of the participants had at least one alcohol-, drug-, or misconduct-related event reported by either the DAPA, the supervisor, or both. Mean negative incidents score for the sample was 1.4, with a range of 0 to 12 incidents. The most frequently cited problems were (1) NJP actions, with or without alcohol involvement (about 19% of the sample); (2) late for

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work due to alcohol abuse (13%); and (3) legal or disciplinary incidents involving alcohol (13%). Half (51%) of those involved in an adverse event were separated from the Navy within one year.

Job Performance

Table 3 presents the supervisor ratings of job performance, recommendations for reenlistment or advancement, actual contract renewals or promotions, and three indices of absenteeism drawn from the negative events scale. Nearly 83% of the participants were rated as satisfactory or highly satisfactory performers, and more than 87% were recommended for service reenlistment or advancement, though only one third of these individuals were actually awarded contract extensions or rate advancements. According to their supervisors, about 32% of the participants had experienced alcohol-related problems, and 26% had exhibited conduct difficulties during their first year posttreatment.

Table 3. Job performance at 12-month follow-up.

Performance criterion	Percent
Performance evaluation	
Current job performance rating:	
Highly satisfactory	49.6
Satisfactory	33.1
Marginal	7.0
Unsatisfactory	10.3
Reenlistment or advancement	
Recommended for reenlistment/advancement	87.3
Actually reenlisted/advanced	28.6
Problems/adverse consequences	
Late for work due to alcohol abuse	13.4
(average = 3.6 times)	
Lost work days due to alcohol abuse	8.8
(average = 2.7 times)	
Disabilities or illness due to alcohol abuse	2.7
Drunk driving arrest	4.7
Alcohol-related accidents (vehicular or other)	8.4
Legal/disciplinary incident with alcohol involvement	13.1
NJP action (with or without alcohol)	19.0
Court-martial (with or without alcohol)	3.9
Civilian legal action (with or without alcohol)	8.5

Quality of Life

Quality of life was the only major outcome variable that relied entirely on the participants' self-report at follow-up. Overall quality of life, as measured by the Q-LES-Q summary satisfaction scale, showed a small but significant improvement between entry into treatment (mean = 3.8) and 12 months posttreatment (mean = 4.1, $t(512) = -10.44$, $p \leq .001$). The relationship between quality of life and the other criterion variables was weak (see Table 4), suggesting that the participants' life enjoyment and satisfaction were largely independent of the other measures of success that were the goals of treatment. In-depth analysis of the Q-LES-Q subscale change scores and their relationships to both predictors and outcomes is beyond the scope of this report but will be explored in a future paper.

Interrelationships Among Outcome Measures

Table 4 presents the Pearson correlation coefficients among the seven main outcome variables. With the exception of quality of life, the average correlation between outcomes was about .56, indicating that the criterion domains were strongly interrelated but not redundant. Quality of life, on the other hand, showed little relationship with the other measures, the average correlation being about .07.

Table 4. Intercorrelations among principal outcome variables.

Variable	Pearson correlation coefficients						
	1 Alc use	2 Incident	3 Job perf	4 Recomm	5 Retention	6 Dischrg	7 Quality
1. Alcohol use	---						
2. Neg incident	.67**	---					
3. Job perform	-.56**	-.58**	---				
4. Recommended	-.50**	-.59**	.63**	---			
5. Retention	-.42**	-.37**	.52**	.52**	---		
6. Undesir dischrg	.55**	.54**	-.56**	-.64**	-.75**	---	
7. Quality of life	-.11	-.06	.14*	.07	-.02	.02	---

* $p \leq .01$

** $p \leq .001$

Overall Success Score

An overall score of treatment success was computed for each person. The summary score was based on the six objective criterion variables (quality of life was excluded), and only individuals with data on all six variables were included in the analysis. Scores were calculated by assigning a score of 1 to each successful outcome, a score of 0 to unsuccessful results, and summing across outcomes. Successful outcomes were defined as follows: (1) abstinent or essentially abstinent; (2) no negative events reported by either the DAPA or supervisor; (3) job performance rating of "Satisfactory" or "Highly satisfactory"; (4) recommended for reenlistment/advancement; (5) still on active duty after one year; and (6) if discharged prior to one year, reason was not related to alcohol, drugs, or misconduct.

Results are presented in Table 5, which also summarizes the success rates for each of the constituent variables. Mean overall success score was 4.8. A total of 51% of the participants were "totally successful," having scored a 1 on all six outcomes; approximately 5% failed to earn a score of 1 on any criterion. Among the individual outcome measures, the success rate was highest for having been recommended for service contract renewal or promotion (87%) and lowest for having remained free of involvement in any adverse incidents (58%).

Table 5. Success rates for six outcome measures, and frequency distribution of overall success score based on those six outcomes.

Outcome		% Successful
Recommended for reenlist/advancement		87.3
Satisfactory/highly satisfactory job performance		82.7
No alcohol/drug/misconduct discharge		81.9
Retained on active duty (1 full year)		70.5
Abstinent (totally/essentially)		67.5
No negative incidents		58.2
Overall success score[1]	*Score*	*%*
	6	51.0
	5	20.4
	4	12.3
	3	5.4
	2	3.4
	1	2.5
	0	4.9

[1] Sum of positive scores (positive score = 1, negative score = 0) on all six outcome measures.

Outcome Comparisons Among Selected Subgroups

Certain subgroup comparisons have particular relevance for interpreting these results, or are of special interest to treatment program managers. Comparative analyses of predictors and outcomes were performed for the following groups:

Participant Respondents Versus Nonrespondents

As noted earlier, participant respondents resembled nonrespondents in terms of the numerous baseline predictor variables and thus were representative of the sample in those terms. Comparative analyses on the objective criterion variables produced a very different picture, however. Participant respondents scored significantly better than nonrespondents did on all of the outcome measures examined. They were drinking less (mean = 1.7, vs. 2.5 for nonrespondents on the DAPA's 5-point scale, $t(792) = -9.15$, $p \leq .001$); percentage-wise, 78% of responders vs. 54% of nonresponders were abstinent. Respondents had fewer negative incidents reported by DAPAs and supervisors (mean = 0.6 vs. 2.1 incidents, $t(836) = -10.12$, $p \leq .001$). Their job performance ratings were higher (mean = 3.5 vs. 2.9, where 4 = "Hi sat" and 1 = "Unsat," $t(969) = 11.44$, $p \leq .001$); percentage-wise, 95% of responders were rated as satisfactory or highly satisfactory, vs. 70% of nonresponders. Responders were also more likely to have been recommended for reenlistment/advancement (97% vs. 76%, $\chi^2(1) = 82.70$, $p \leq .001$) and more likely to have been awarded the same (35% renewed/promoted vs. 22%, $\chi^2(1) = 16.51$, $p \leq .001$). These results demonstrate that, in terms of objective measures of treatment outcome, the participants who provided subjective data at follow-up were not representative of the sample as a whole but were significantly more successful than were nonrespondents. Their self-reported observations and activities at follow-up are not necessarily inaccurate, and they remain an important source of information for program evaluators. However, data from the participant follow-up questionnaires should be interpreted cautiously and not overgeneralized.

Treatment Completers Versus Noncompleters

The majority (85%) of individuals who failed to complete treatment were expelled because of attitudinal or behavioral problems within the treatment regimen; the remainder were transferred out of the program for a variety of excusable reasons. Failure to complete treatment did not necessarily result in separation from service, but the association was strong. In this sample, 70% of treatment noncompleters (for any reason) were discharged from the Navy prior to the one-year follow-up, compared to 25% early discharges among treatment completers ($\chi^2(1) = 125.86$, $p \leq .001$). Furthermore, those who were technically classified as treatment failures (i.e., noncompleters who were expelled as not amenable or absent without authorization) had a higher early separation rate (75%) than did members who left treatment early for other reasons (46%), $\chi^2(1) = 6.44$, $p \leq .01$.

When treatment completers and noncompleters (mean length of stay = 42.1 vs. 29.0 days, $t(1,362) = 14.27$, $p \leq .001$) were compared on the other independent variables, the two groups were found to differ on only three: (1) paygrade (median = E-5 vs. E-4 for completers and

noncompleters, respectively, $\chi^2(3) = 38.33$, $p \leq .001$), (2) marital status (37% married vs. 13%, $\chi^2(1) = 29.13$, $p \leq .001$), and (3) aftercare attendance (8.8 months attendance vs. 2.9 months, $t(786) = 10.33$, $p \leq .001$; 93% of treatment completers attended aftercare meetings for at least one month, vs. 48% of noncompleters). Comparisons on the dependent measures rendered significant differences on all outcomes except quality of life. Those who completed the treatment program were drinking less at follow-up (DAPA scale mean = 2.0, vs. 2.8 for noncompleters, $t(783) = 4.09$, $p \leq .001$; abstinence rates were about 69% and 42%, respectively). Completers experienced a higher overall retention rate (75% remained on active duty after one year, vs. 30% of noncompleters, $\chi^2(1) = 125.86$, $p \leq .001$), had fewer unfavorable discharges (13% of early discharges among treatment completers were for alcohol, drugs, or misconduct, vs. 59% among noncompleters, $\chi^2(1) = 178.40$, $p \leq .001$), were involved in fewer adverse events (mean = 1.3 vs. 2.2, $t(828) = -3.10$, $p \leq .001$), and were given better performance evaluations (mean rating = 3.3 vs. 2.5, $t(959) = 6.46$, $p \leq .001$; 86% of treatment completers were rated as satisfactory/highly satisfactory, vs. 51% of noncompleters.)

A small but theoretically interesting group that warrants brief examination are those individuals who did not complete treatment yet remained on active duty for the full follow-up year. The characteristics of these "noncompleter survivors" are described next; due to the small sample size ($n = 42$, with missing data on some variables), no statistical comparisons were conducted. Although these individuals were similar to all noncompleters demographically (median paygrade = E-4; 15% married), they more closely resembled the treatment completers in terms of aftercare attendance and outcomes. Most (71%) of the noncompleter survivors failed to finish the treatment program because they were not amenable, yet 91% attended aftercare meetings, the average length of attendance being 7.7 months. Their mean score on the DAPA drinking item was 2.2, with 65% of the group either totally or essentially abstinent after one year. Mean number of negative incidents was 1.0, and 78% received satisfactory/highly satisfactory job performance ratings. These results suggest that, for certain individuals, the formalized, 6-week treatment process itself might be secondary to some other factor (or factors) in accomplishing rehabilitation.

Drinkers Versus Nondrinkers

Some investigators have observed that abstinence alone is a reliable index of success on other outcomes (Schneider et al., 1995; Wright et al., 1990). This observation was supported in the present study. Figure 7 depicts the data curves for five of the main outcome variables, plotted against three levels of alcohol use at follow-up: abstainers, occasional drinkers, and frequent/heavy drinkers. All outcomes were scored so that a lower score was more favorable, a higher score more unfavorable. For example, job performance ratings were computed to reflect the percentage of individuals rated as marginal or unsatisfactory, and the negative events score was transformed into a binary variable indicating involvement with one or more negative incidents.

It is readily apparent in Figure 7 that increased alcohol use was strongly and consistently related to poorer outcomes. Chi-square analyses of outcome by drinking categories were

significant for all five outcomes ($\chi^2(2)$ = 242.32, 191.55, 256.39, 295.15, and 205.81 for negative incidents, early discharge, poor job performance, pejorative discharge, and not recommended for reenlistment/advancement, respectively, all $p \leq .001$). Post-hoc analyses revealed that this relationship held not only for frequent/heavy drinkers relative to the other two groups, but for the smaller differences between abstainers and occasional drinkers as well (chi-square tests between the two groups were significant at $p \leq .01$ for all five outcomes). Yet abstainers were not entirely free of unfavorable outcomes, most notably involvement in one or more negative incidents. As explained in the Methods section, those events ranged from minor transgressions to serious offenses and did not necessarily involve alcohol.

In Figure 7, the percentage of discharges for undesirable reasons was computed on the entire sample, rather than on just that subset of individuals who had been discharged within one year. This was done to avoid confusion when comparing success rates across variables on the graph, but as a result the figures presented for the outcome "undesirable discharge" are not independent of the outcome "discharged within one year" (i.e., all undesirable discharges are subsumed within early discharges, and their numbers could not exceed those of the larger group). The more appropriately computed values for undesirable discharges are based only on early discharges, and they follow the same pattern: among abstainers, occasional drinkers, and frequent/heavy drinkers, respectively, 25%, 68%, and 91% of early discharges were separated for alcohol, drugs, or misconduct ($\chi^2(2)$ = 63.97, $p \leq .001$).
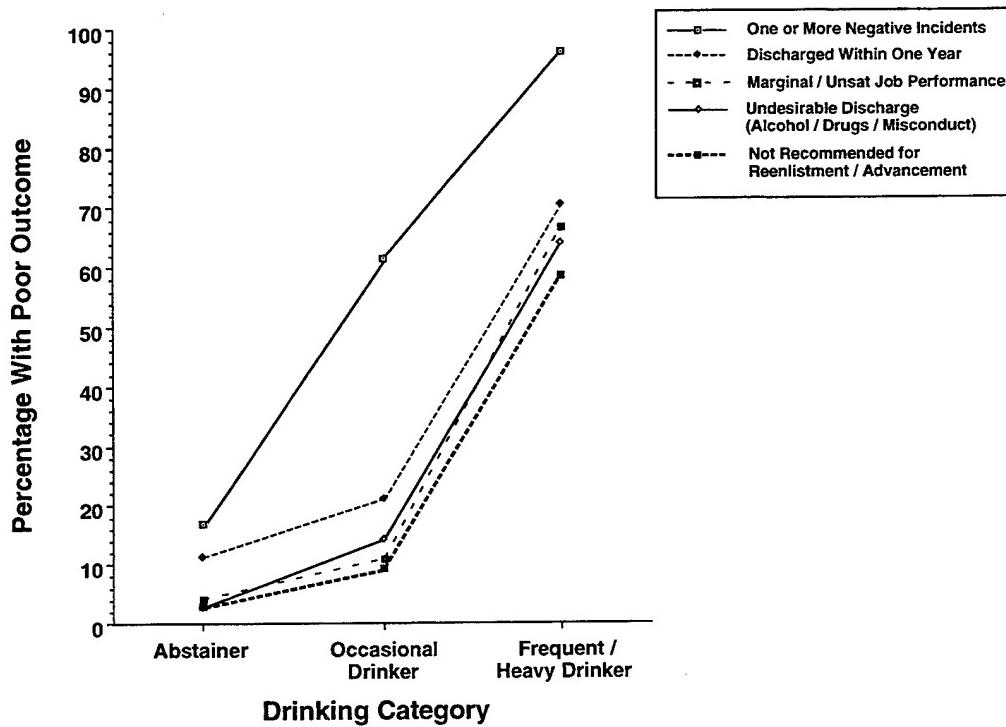
Figure 7. Percentage of subjects with unfavorable 12-month outcomes, by three levels of alcohol use at follow-up.

The subjective quality of life variable is not included in Figure 7. Mean scores for this measure—4.1, 4.1, and 3.4 for the three groups, respectively ($F(2, 424) = 7.78$, $p \leq$ .001)—revealed that while frequent/heavy drinkers expressed significantly less satisfaction with their lives than did members of the other two categories, light drinkers were as happy with their quality of life as were abstainers.

Aftercare Attenders Versus Nonattenders

Participation in aftercare is considered an integral part of the treatment process. However, some members did not attend any aftercare sessions at all, and a substantial number attended for fewer than 12 months. To explore the relationship between aftercare participation and treatment success, the sample was divided into five groups according to the number of months that a member had attended AA or comparable aftercare support group meetings: 0 months, 1 to 3 months, 4 to 6 months, 7 to 9 months, and 10 to 12 months. The groups were then compared on their overall success score. Results are presented in Figure 8. Time in aftercare was positively related to the summary success score, $F(4, 440) = 50.16$, $p \leq .001$, with nonattenders scoring an average of 2.5 on the 6-point scale, while those with the best attendance records (10 to 12 months) had a mean success score of 5.5.
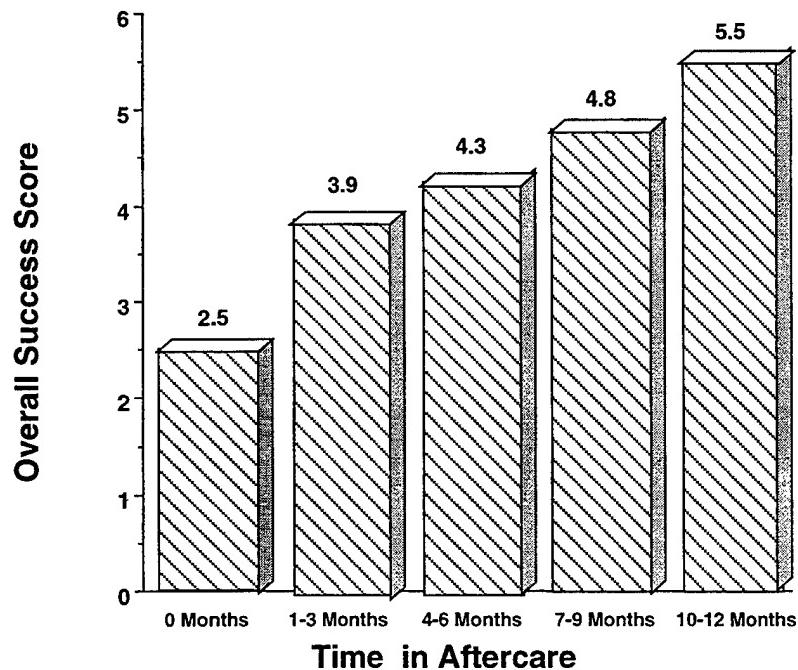
Figure 8. Overall success score (based on sex outcome measures), by months of aftercare attendance.

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Figure 9 depicts the aftercare-success relationship for each of the seven outcome variables (including quality of life) individually. To facilitate succinct graphic presentation of the results, aftercare attendance was categorized into three groups (0 months, 1 to 6 months, and 7 to 12 months), and standardized scores were computed for the seven dependent measures. The aftercare groups were then compared on each outcome using analysis of variance of mean z-scores. Note that a lower score is more favorable on the first three outcomes pictured: alcohol use, number of negative incidents, and reason for discharge (1 = pejorative, 0 = nonpejorative), the latter being scored only for individuals who were discharged within one year; a higher score is better on job performance, recommendation for reenlistment/advancement (1 = yes, 2 = no), retention (time to discharge), and quality of life. Aftercare attendance was positively associated with favorable outcomes. The relationship was significant at $p \leq .001$ for every variable except quality of life, which was not significant ($F(2, 659) = 176.12$, $F(2, 593) = 63.07$, $F(2, 187) = 28.13$, $F(2, 693) = 77.71$, $F(2, 612) = 67.06$, and $F(2, 792) = 170.38$ for alcohol use, negative incidents, undesirable discharge, job performance, recommend reenlist/advance, and retention, respectively).

Months of Aftercare Attendance
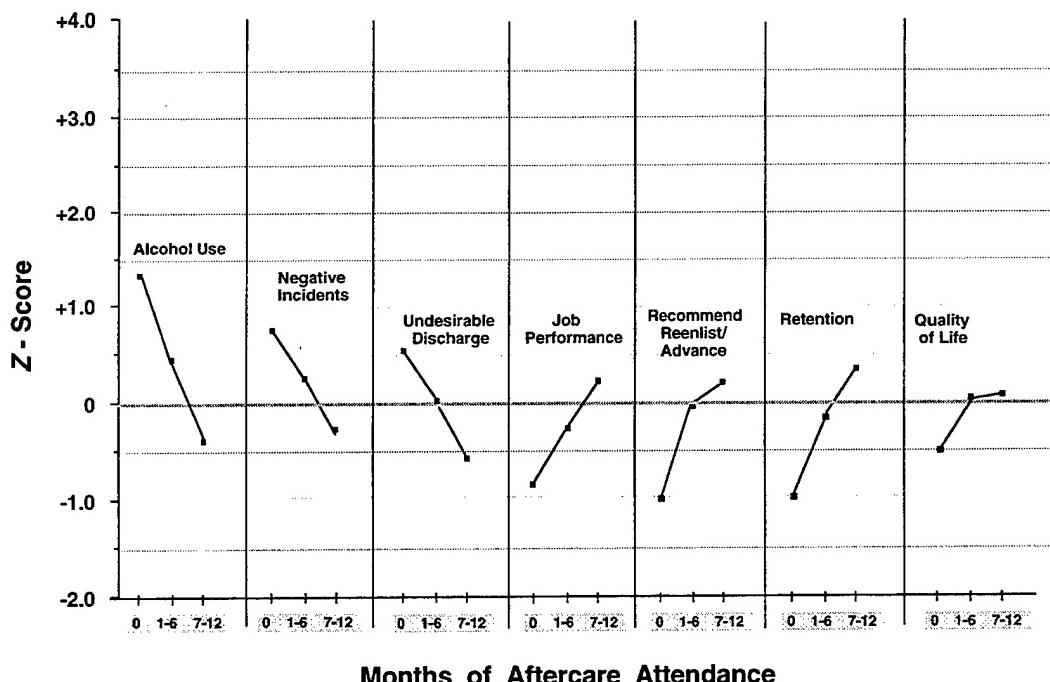
Figure 9. Standardized treatment outcome scores across three categories of aftercare participation (time in months).

Comparisons With Other Military Samples

This set of analyses does not involve selected subgroups, but rather it compares treatment outcomes for the present sample with three previous research studies. The three earlier reports

are: (1) the Caliber Associates cost-effectiveness study of the Navy rehabilitation program (Devine et al., 1989); (2) the work of Kruzich and his colleagues describing a 6-week alcohol treatment program at the William Beaumont Army Medical Center (WBAMC) (Kruzich et al., 1986); and (3) the TRISARD evaluation, based on Army, Navy, Air Force, and Marine Corps alcohol inpatients at the Bethesda Naval Hospital (Wright et al., 1990). These studies were similar to the present one (NHRC) in that all focused on an active-duty military population treated in a 6-week residential program. However, the investigators all defined treatment success in slightly different terms. To effect meaningful comparisons with the current study, the Caliber, WBAMC and TRISARD definitions were applied to the NHRC data set, and treatment outcomes for the present sample were computed in those terms. Only those NHRC subjects with complete data on all variables used to calculate a particular outcome (or set of outcomes) were included in the analysis for that outcome. Results are presented in Table 6.

Outcomes for the Caliber and NHRC samples were almost identical, with rehabilitation success rates of 53% and 54%, respectively. The Caliber study used completion of enlistment term to partly define success, but the NHRC study did not collect this information. Instead, one-year retention on active duty was employed in the calculations. NHRC results also corresponded satisfactorily with the WBAMC outcomes, particularly the percentage of clinical successes (63% and 56% for WBAMC and NHRC, respectively); occupational success rates were somewhat more disparate (77% vs. 62%).

The greatest discrepancies in success rates occurred when comparing NHRC outcomes with the TRISARD results. The analyses were limited to participants who had completed treatment and had remained on active duty for the following year, since the reported TRISARD results were (1) based on program graduates, and (2) drawn from the 12-month data point on their 24-month outcome survival data curve. It was unclear whether the TRISARD outcome of "totally successful" included essentially abstinent as well as completely and continuously abstinent individuals, so the less rigorous standard was applied in analyzing the NHRC outcomes. However, the NHRC success rates were only slightly better than half the rates reported for the TRISARD clinical and total success measures. It will be recalled that the majority of NHRC participants had not attended aftercare for a full 12 months as stipulated by the TRISARD criteria. Because this variable alone could account for the relatively low NHRC success rates, the percentages were recomputed requiring only 6 months of aftercare attendance. This change improved the results, rendering clinical success = 60% (vs. 46% using the criterion of 12 months aftercare), total success = 52% (vs. 41%)—but the values remained well below the corresponding TRISARD rates of 82% and 77%.

Predictors of Treatment Outcomes

Correlational analyses between the 24 independent variables and the 7 criterion measures produced 15 predictors that were significantly correlated with at least one outcome. The remaining nine prognosticators failed to correlate at $p \leq .01$ with any of the principal dependent measures and were dropped from further analysis. Correlation coefficients for the resultant pool

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Table 6. Comparison of treatment success rates in the present (NHRC) study and three other active-duty military rehabilitation samples.

Outcome	Variables defining treatment success	Percent successful	
		CALIBER[1] $(n = 7{,}348)$	NHRC[2] $(n = 687)$
Rehabilitation success	Completed treatment Completed enlistment term Recommended for reenlistment No adverse incidents	53%	54%
		WBAMC[3] $(n = 210)$	NHRC $(n = 566)$
Clinical success	Abstinent (total/essential) No adverse incidents	63%	56%
Occupational success	Abstinent or occasional drinking No adverse incidents Satisfactory job performance	77%	62%
		TRISARD[4] $(n = 338)$	NHRC $(n = 334)$
Clinical success[5]	Abstinent (total/essential) 12 months aftercare attendance Compliant with recovery program Compliant with Antabuse (if prescribed)	82%	46%
Occupational success[5]	No adverse incidents Supervisor says treatment successful Recommended for advancement	90%	73%
Total success[5]	Clinical success (see above) Occupational success (see above)	77%	41%

[1] Caliber Associates, Navy sample: Devine, P., Bishop, S., & Mensch, J. R. (1989). Cost benefit study of the Navy's level III alcohol treatment program - Phase Two: Rehabilitation vs. replacement costs. Washington, DC: Caliber Associates.

[2] Naval Health Research Center, Navy sample (present study).

[3] William Beaumont Army Medical Center, Army sample: Kruzich, D. J., MacDonough, T., Hawkins, M., & Silsby, H. D. (1986). Alcoholism treatment outcomes among career soldiers. The International Journal of the Addictions, 21(1), 139-145.

[4] Tri-Service Alcoholism Recovery Department (Bethesda Naval Hospital), Army/Navy/Marine Corps/Air Force sample: Wright, C., Grodin, D. M., & Harig, P. T. (1990). Occupational outcome after military treatment for alcoholism. Journal of Occupational Medicine, 32(1), 24-32.

[5] Samples selected to include treatment completers and one-year 'survivors' only.

of significantly associated variables are presented in Table 7. The strongest correlates of outcomewere aftercare, paygrade, and treatment completion, all of which correlated significantly with six of the seven dependent measures, the average coefficient being approximately .40 for aftercare, .18 for paygrade, and .18 for treatment completion (marital status also correlated with six outcomes, but the average correlation was lower, about .11).

Table 7. Pearson product-moment correlation coefficients between prognostic indicators used in regression analyses and 12-month treatment outcomes.

Predictor				Outcome			
	Alc use	Incident	Job perf	Recomm	Retention	Dischrg	Quality
1. Paygrade	-.22**	-.19**	.20**	.15**	.22**	-.23**	.09†
2. Marital status	-.09*	-.09*	.14**	.10*	.17**	-.17**	.03
3. Children at home	-.16**	-.06	.10†	.10†	.11*	-.12*	-.00
4. Abused	-.00	-.00	-.02	-.00	-.01	-.00	-.12*
5. Age first drink	-.08†	-.01	.03	.04	.00	.01	.18**
6. Social functioning	.01	.04	.03	-.02	.02	.02	.27**
7. Judicial record	.05	.06	-.07†	-.06	-.04	.08*	.02
8. Polydrug	.02	.07†	-.03	-.01	-.11**	.11**	-.03
9. Alcohol intake	.09*	.06	-.06	-.02	-.11**	.09**	-.03
10. ALCINVOL	.03	.03	-.05	-.06	-.13**	.06†	-.16**
11. GSI	.00	-.02	-.06	-.00	-.11**	.04	-.25**
12. Severity index	.07	.04	-.06†	-.00	-.11**	.06†	-.11†
13. Length of stay	-.05	-.04	.14**	.14**	.21**	-.16**	-.05
14. Completed treatmt	-.16**	-.11*	.24**	.24**	.41**	-.36**	-.01
15. Months aftercare	-.59**	-.46**	.45**	.41**	.57**	-.54**	.10†

† $p \leq .05$ * $p \leq .01$ ** $p \leq .001$

Stepwise multiple regression equations were computed to determine the unique contributions of the 15 predictors to the treatment outcome scores. All 15 variables were allowed to enter the equations predicting each of the outcome measures in a forward stepwise procedure. As shown in Table 8, months of aftercare attendance was the single best predictor of treatment success, accounting for almost all of the variance in six of the seven outcome scores: drinking behavior, negative incidents, retention on active duty, undesirable discharge, job performance, and recommendation for reenlistment/advancement. Paygrade and completion of treatment were the next most consistent predictors, entering into six and three of the equations, respectively. Only two other predictor variables emerged in any of these equations: having children living at home (a predictor of alcohol use), and the ALCINVOL score of general alcoholism (predicting retention). Multiple R values were large, ranging from .43 (recommended for reenlistment/advancement) to .63 (retention); total percent of variance accounted for by these few variables was accordingly substantial, ranging from 18% to 39%.

Table 8. Significant predictors of treatment outcomes (stepwise multiple regression analyses).

Outcome	Predictor	β	Beta	R	Adj R^2	R^2Ch	SigCh
Alcohol use	Aftercare	-.150	-.553	.586	.342	.344	.000
	Paygrade	-.072	-.095	.597	.353	.012	.005
	Children	-.206	-.083	.602	.358	.006	.044
	(constant)	3.707					
Negative incidents	Aftercare	-.219	-.427	.456	.206	.208	.000
	Paygrade	-.151	-.106	.467	.214	.010	.020
	(constant)	3.855					
Undesir discharge	Aftercare	-.037	-.439	.543	.294	.295	.000
(alc/drug/miscond)	Compl treatmt	-.229	-.182	.573	.325	.033	.000
	Paygrade	-.034	-.144	.589	.342	.019	.001
	(constant)	.842					
Retention	Aftercare	.123	.460	.571	.324	.326	.000
(time to discharge)	Compl treatmt	.927	.232	.612	.372	.049	.000
	ALCINVOL	-.012	-.113	.624	.385	.015	.002
	Paygrade	.070	.093	.630	.392	.008	.021
	(constant)	2.396					
Job performance	Aftercare	.087	.412	.452	.203	.205	.000
	Paygrade	.088	.149	.475	.221	.021	.001
	(constant)	2.114					
Recommended for	Aftercare	.025	.344	.406	.163	.165	.000
reenlist/advance	Paygrade	.020	.097	.419	.171	.010	.025
	Compl treatmt	.109	.100	.429	.178	.009	.039
	(constant)	.481					
Quality of life	Soc function	.159	.196	.274	.072	.075	.000
	Age first drink	.019	.130	.311	.090	.021	.009
	GSI	-.253	-.134	.332	.101	.014	.036
	(constant)	3.451					
Quality of life--	GSI	-.428	-.226	.250	.059	.063	.000
revised[1]	Age first drink	.020	.135	.284	.074	.018	.018
	(constant)	4.166					

[1] Regression equation for *Quality of life--revised* excluded the baseline Q-LES-Q variable *social functioning* from the predictor set.

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None of these variables predicted quality of life, however. Rather, quality of life (overall Q-LES-Q scale) was predicted by the Q-LES-Q social functioning score at baseline, age of first drink, and GSI psychological dysfunction score, which together accounted for 10% of the variance in life enjoyment. Because social functioning is a component of overall life quality on the Q-LES-Q, the association between the two measures, albeit at two different points in time, is not unexpected. But it is also somewhat spurious in the present context and might mask more meaningful associations between life quality at follow-up and other prognostic indicators. Therefore, the regression analysis was performed again, dropping social functioning from the predictor set. The results, which are presented as *Quality of life—revised* in Table 8, again revealed GSI score and age of first drink to be determinants of life quality, with only a modest decrement in the amount of variance accounted for as a result of excluding the social functioning variable.

Table 8 compares each of the outcome measures in common statistical terms. While two of the outcome variables were dichotomous, linear multiple regression was deemed the most useful procedure to describe and compare strengths of association between predictors and outcomes. When the two categorical measures--undesirable discharge and recommendation for reenlistment/advancement--were regressed on the predictor set using a logistic regression model, aftercare remained the most significant predictor in both equations, followed by paygrade. Predicted outcomes from the linear probability model correlated with predicted scores based on the logistic model at .94 for undesirable discharge and .93 for career recommendation.

Discussion

Navy personnel who were treated in the service's standard 6-week residential alcohol rehabilitation program improved dramatically in terms of their drinking behavior and exhibited positive outcomes on a number of job-related measures as well. More than two thirds of the sample were abstinent at follow-up, while alcohol use among those who were still drinking was considerably reduced relative to baseline alcohol intake. Serious disciplinary infractions had decreased, quality of life had improved, and the vast majority of participants had been recommended for career reenlistment or promotion. These results, based on a large sample and a prospective, multivariate design, support earlier findings (Devine et al., 1989) that the Navy operates a highly successful treatment program. One reason for the program's success is undoubtedly the early intervention afforded by the Navy's "zero tolerance" policy. A sailor who has come to the attention of a military authority because of alcohol-related problems is likely to be referred for counseling, even if his/her job performance is satisfactory. And though the residential program requires that patients be alcohol-dependent before they can be admitted for treatment, a fine line exists between an individual exhibiting a maladaptive pattern of alcohol use and one who has become dependent, psychologically if not physically. Indeed, the DSM-III-R classification criteria have de-emphasized the classical physiological symptoms of dependency, namely, tolerance and withdrawal, while expanding the definition to include a number of cognitive and behavioral symptoms (U.S. DHHS, 1990). Given the relative youth and health of this population, physical symptoms of alcoholism are minimal, and diagnosis must rely heavily

on behavioral expressions of alcohol dependency. Navy patients therefore tend to be identified and treated earlier in the development of their disorder than they might be in the civilian sector.

Evidence suggests that some, perhaps many, problem drinkers are able to reduce or eliminate their alcohol use with minimal or no formal treatment (Emrick, 1975; Humphreys, Moos, & Finney, 1995; Sobell, Sobell, Toneatto, & Leo, 1993). Thus, in the absence of a no-treatment control group, the outcomes observed in the present study cannot be attributed with certainty to the treatment intervention. Navy policy did not permit inclusion of a no-treatment group in the study design. Regulations require that help be offered to any member experiencing alcohol-related difficulties, and if the member refuses treatment, he/she is usually separated from naval service. Treatment waiting lists might have served as a source of control subjects, but the lists are protected information and were not made available. Analyses of treatment noncompleters were performed to help compensate for this lack, and results showed that noncompleters scored significantly more poorly than completers did on every outcome measure except quality of life. However, because noncompleters had attended the program for an average of 4 weeks before being terminated, they were not a true no-treatment sample; moreover, their expulsion from the program was usually due to an "attitude problem" that might have eclipsed their "drinking problem" in its impact on their follow-up evaluations. Therefore, the only conclusion that can be drawn from the present results is that completion of the treatment contract was a significant predictor of outcome.

As other investigators have found, drinking at follow-up was associated with poorer outcomes in other areas as well, though the relationship was definitive only for frequent/heavy drinkers. Differences in mean outcome scores between abstainers and light drinkers, while statistically significant, were fairly small. An exception was the prevalence of negative incidents, which occurred much more frequently among light drinkers than among nondrinkers. Yet adverse events were also more likely than were other negative outcomes to be seen in the group of abstainers, implying that behavioral problems were not necessarily tied to alcohol use.

There is a tendency to assume that alcohol abuse creates associated problems, and that the solution is abstention from alcohol. However, abstinence is not consistently associated with improvement in other areas (Moos et al., 1990), nor does improvement in psychological, social, or occupational functioning necessarily demand total abstinence. If a primary goal of treatment is a member's continued productive service in the Navy, the distinction between alcohol use and what could be called military deportment might be worth exploring further. For example, post-hoc analysis revealed that 67% of the participants who were still drinking at follow-up were nevertheless rated as satisfactory or highly satisfactory job performers and were recommended for reenlistment or promotion. Measured by the "golden standard" of abstinence, these individuals were treatment failures, but evaluated in terms of service retention and military work performance, they were successes.

The controversy surrounding controlled drinking as a viable treatment objective is not new, and the present data certainly do not resolve it. But in searching for alternative approaches to treatment, program developers might consider some of the challenges that have been raised

regarding the "progressive disease" concept of alcoholism and its incumbent goal of complete abstinence (McClellan et al., 1981; Moos et al., 1990; Pattison, 1976; Shaw, 1980). The Navy patients seen in the present study closely resembled adolescent nonpatients in terms of their psychological dysfunction at intake. Their level of alcohol dependency was low, relative to other alcohol inpatient cohorts. These factors, combined with the persistence of behavioral problems (albeit much reduced) at follow-up, even among nondrinkers, are more suggestive of immature personality development than of disease. Such a view finds support in the work of McLellan et al. (1981), who found that even among older, more addicted VA patients, improvement in psychological functioning bore a stronger relationship to general improvement than did posttreatment alcohol use, and who noted that the progressively deteriorated alcoholic "probably represents only a fraction of the total patient population" (p. 238).

Comparisons of treatment effectiveness with other military samples revealed both marked similarities and puzzling differences. Overall treatment success rates were most concordant between the Caliber (Devine et al., 1989) and NHRC studies, both of which utilized a Navy sample and emphasized career-oriented criteria (retention, promotion, disciplinary incidents). Yet the percentages of treatment successes (53% and 54% for Caliber and NHRC, respectively) were also among the lowest across the three pairs of studies examined, perhaps because retention was central to the definition of success. It should be borne in mind that although continued military service is an important outcome, particularly from the vantage point of cost-effectiveness, the reasons for attrition (as well as reasons for untoward events) are many and do not necessarily signify ineffective treatment or alcohol abuse. Interestingly, when "total success" was computed in terms of the six NHRC outcome criteria (only three of which were the same as those used in the Caliber study), the overall NHRC success rate was almost the same: 51%.

Success rates were most discrepant between the NHRC and TRISARD (Wright et al., 1990) studies. This disparity was unexpected, given the similarities in design, sample size, and criterion variables employed in the two studies. One possible explanation for the observed differences is that the samples were not comparable. The NHRC sample was composed entirely of Navy personnel, while TRISARD included Army, Air Force, and Marine Corps members, with only 39% Navy. The four services differ in many respects—recruitment criteria, job demands, mobility, culture, and community—all of which could have influenced the recovery process. In addition, the two samples differed on a number of demographic and treatment variables. The TRISARD group was older, included twice as many women, and had a higher percentage of married personnel. Compared to the NHRC participants, four times as many TRISARD patients had an immediate family member who had been treated for alcoholism, and most of the patients themselves had received prior treatment before entering TRISARD. About 80% of the TRISARD participants received Antabuse during their hospitalization, as opposed to 15% of NHRC participants. However, since outcomes were not related to service affiliation, gender, family history of alcoholism, previous treatment, or use of Antabuse in either study, the impact of these demographic differences should have been minimal, barring a cumulative effect.

A surprising 63% of TRISARD program nongraduates were rated as "totally successful" according to that study's definition. Wright et al. (1990) did not provide a description of these

patients, but compared to noncompleters in the present study, they were a remarkable group. A post-hoc analysis revealed that only 2 of the 142 NHRC noncompleters (1.4%) were totally successful in terms of the TRISARD criteria. It is doubtful that differences in military affiliation or demographic makeup could account for such disparity, though in the absence of descriptive data about the TRISARD nongraduates, this possibility cannot be ruled out. A more likely explanation is that differences in statistical methodology between the studies are largely responsible.

The TRISARD results were based on a survival analysis that obtained follow-up data at 3-month intervals and discontinued follow-up when participants left military service. Although the TRISARD report specified participation in "all of the required aftercare," consisting in part of "12 months of weekly aftercare therapy sessions," as a measure of success, the application of this time-linked criterion to members discharged before the end of 12 months was not clear. For example, an individual who was performing successfully on all counts at 6 months and then discharged might have been included in the TRISARD overall analysis as a success, whereas the same individual would have been scored as a failure in the NHRC comparison computations because the documented aftercare was limited to 6 months. (In fact, when the criterion was lowered to 6 months' attendance and NHRC rates were recomputed, the success percentages increased substantially.) Success rates for specific outcomes used in the NHRC comparisons (Table 6) were taken from the 12-month data point on a survival function graph published in the TRISARD report. However, overall success rates were simply cited in the text of that article and might have included participants' last available follow-up reports.

It is relevant here to recall the small group of NHRC program nongraduates who were not separated early but continued in their Navy careers for the full year posttreatment. These participants, having received essentially the same amount of treatment as all other noncompleters, were nevertheless almost as successful after one year as the treatment completers in terms of their drinking and occupational outcomes. Moreover, most noncompleter survivors had been terminated from treatment for the same reason as other noncompleters: not amenable to treatment. If neither time in treatment nor attitude differentiated the two groups, what might have accounted for the survivors' greater success? The answer must lie in those characteristics that did differentiate the groups, namely, paygrade, marital status—and aftercare attendance.

The consistency and magnitude with which aftercare emerged as a predictor in the foregoing analyses were striking. Previous research has found that patients who participate in aftercare sessions are three times more likely to remain abstinent than are nonattenders or early aftercare dropouts (Pokorny et al., 1973; Walker et al., 1983). Using discriminant analysis to classify patients with successful versus unsuccessful drinking outcomes after 9 months, Walker et al. (1983) found duration of aftercare to be a more robust discriminator than a combination of 10 pretreatment variables. In the present study, aftercare attendance was related not only to alcohol use, but to measures of conduct and career success as well. And in multiple regression analyses, aftercare proved to be a more robust predictor of these multidimensional outcomes than 14 other prognostic variables, including several clinical variables not usually examined in previous studies (and not examined in concert in any).

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Aftercare alone accounted for between 16% and 34% of the variance in the regression equations. Family background, clinical profile (including severity of dysfunction in the range presented by these patients), and most demographic characteristics were not predictive of outcome; only paygrade and completion of treatment emerged as consistent co-predictors. These findings have significant implications for program administrators. Paygrade, though predictive of success, cannot be exploited to enhance treatment outcome other than in screening potential patients into the program. The value of treatment completion as an outcome discriminator is low, since nearly all patients finish the program, and with a current completion rate of 90%, there is little room for improvement on this factor. But aftercare attendance is both predictive and suboptimal—and, most importantly, is potentially modifiable in the service of treatment effectiveness.

More than a decade and a half ago, Costello (1980) recommended that treatment programs place high priority on the goal of frequent aftercare contact soon after discharge from treatment. The Navy strongly concurs and has enjoined all commanding officers and DAPAs to become active advocates for members who are in an aftercare status. Detailed guidance has been provided to assist DAPAs and commanders in this role, but supporting resources, such as access to community AA meetings, are not always available, especially during deployments, and aftercare adherence is difficult to monitor. The DAPA's personal interest is most assuredly a source of encouragement and support for members in recovery. But mandating aftercare and documenting compliance cannot stand in for that individual's own motivation and commitment. Program evaluators must discover predictors of aftercare attendance, "especially those malleable to influence rather than fixed" (Costello, 1980, p. 53), and explore ways of using those factors to enhance aftercare compliance. For example, Ahles and his colleagues (1983) experimentally employed behavioral contracting to help increase aftercare attendance. More research of this kind is needed.

Summary and Conclusions

The purpose of this report was twofold. First, the study sought to provide a description of the Navy's alcohol rehabilitation inpatients in terms of a variety of potentially influential pretreatment characteristics and a number of different Navy-relevant outcomes. Second, it undertook to discover predictive relationships between prognostic indicators of treatment success and actual outcomes after one year. The study captured a broad array of patient data from several different domains, including patient demographic characteristics, personal background, family history, behavioral and psychological dysfunction, alcohol intake, severity of dependency, use of Antabuse, and compliance with treatment. Outcomes were measured in terms of alcohol intake, adverse events potentially related to alcohol use, job performance, supervisor's recommendation for continued service or advancement, retention in the naval service, reason for discharge, and perceived quality of life. The risks of statistical error involved in analyzing such a large number of variables were mitigated by (1) recruiting an unusually large sample of alcohol program participants for the evaluation, (2) obtaining a high follow-up response rate, (3) relying on robust multivariate analytic procedures, and (4) establishing the criterion for all tests of

significance at the conservative $p \leq .01$ level. Validity was further ensured by employing multiple and primarily objective sources of outcome data.

Results of the analyses furnished the following profile of a "typical" Navy alcohol patient. This description, based on group means or majority percentage scores, is offered by way of a summary only. It does not represent every patient, nor even a single real patient, nor does it represent the actual relationships among the various characteristics.

The average participant was a single, white male, 27 years old, with a high school education and a junior enlisted rating. He had been in the Navy for almost 7 years. He was raised in a broken home, where one or both parents exhibited a drinking problem, though no immediate family members had been treated for alcoholism. He had not been abused as a child (though many of his program cohorts had been). He enjoyed his life and his social relationships, but he had a history of trouble with authorities and was probably referred to treatment in response to some incident. This was his first experience with alcohol treatment.

At intake, he was drinking the equivalent of two 6-packs of beer every other day. His alcohol dependency was significantly lower than that of alcohol patients from either the VA or civilian hospitals, but he reported experiencing three or four of six classical symptoms of dependency. He was treated without Antabuse. He evidenced more psychological problems than normal (nonpatient) adults but fewer than normal adolescents did; his score of psychiatric symptoms was about half that of psychiatric patients. He conformed to the treatment regimen, completed the program on time, and was discharged with a fair prognosis. He returned to duty at his command, adhered to the recovery program prescribed during treatment, and attended AA or other aftercare meetings for about 8 months.

At the end of one year, he was still on active duty and totally or essentially abstinent. His job performance was very satisfactory, and he had been recommended for reenlistment or advancement, though the recommended orders had not been awarded. His conduct was no longer problematic, and he was still enjoying life—more, in fact, than he had before treatment. He represented the 51% of program participants who were successful on every major outcome measure. And the apparent key to his success was aftercare.

The relative functionality of this group of participants, combined with the fact that many of the immutable characteristics that might have lead to alcohol abuse initially were not determinants of treatment outcome, suggests that this population might respond well to a less intensive intervention. Focusing resources on aftercare support might also be a cost-effective option, with particular attention paid to research, program evaluation, and possibly the development of alternatives to the AA model. This study provides a foundation for examining the effects of an experimental treatment modification recommended by BUMED, which was to reduce the standard length of the residential treatment program from 6 weeks to 4 weeks. Results from that evaluation are currently being analyzed and will be presented in a forthcoming report.

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Navy alcohol program managers are seeking alternative treatment modalities to help
manage costs and expand treatment availability. To fairly evaluate alternatives,
information is needed regarding treatment success rates and predictors of outcome.
Participants in this evaluation were 1,380 active-duty patients (95% male) in the
Navy's 6-week residential alcohol rehabilitation program. Questionnaires completed
at the beginning of treatment captured demographic data, personal history, and
clinical profile. One-year follow-up questionnaires were obtained from participants,
their work supervisors, and their Drug and Alcohol Program Advisors (DAPAs). Cri-
terion measures included alcohol use, negative incidents, job performance, career
recommendation, retention on active duty, reason for discharge, and quality of life.
Participants demonstrated 12-month success rates ranging from 58% to 87% on the
various criterion measures. Approximately 68% of the sample were abstinent at
follow-up; alcohol use was related to paygrade as well as to other outcome measures.
Regression analyses revealed that a single predictor--months of aftercare attendance--
accounted for most of the variance in outcomes.

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